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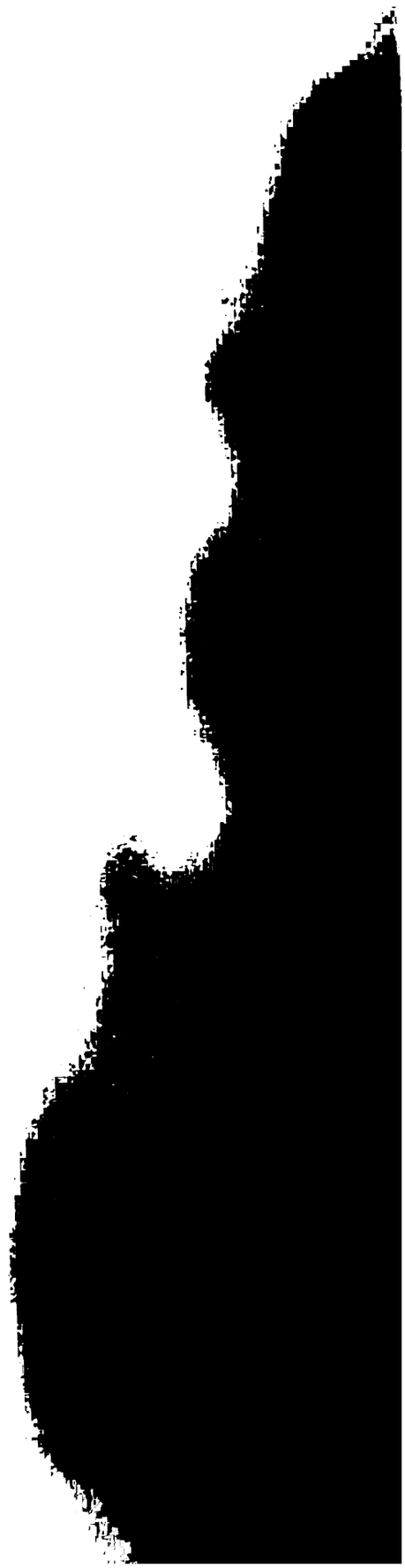

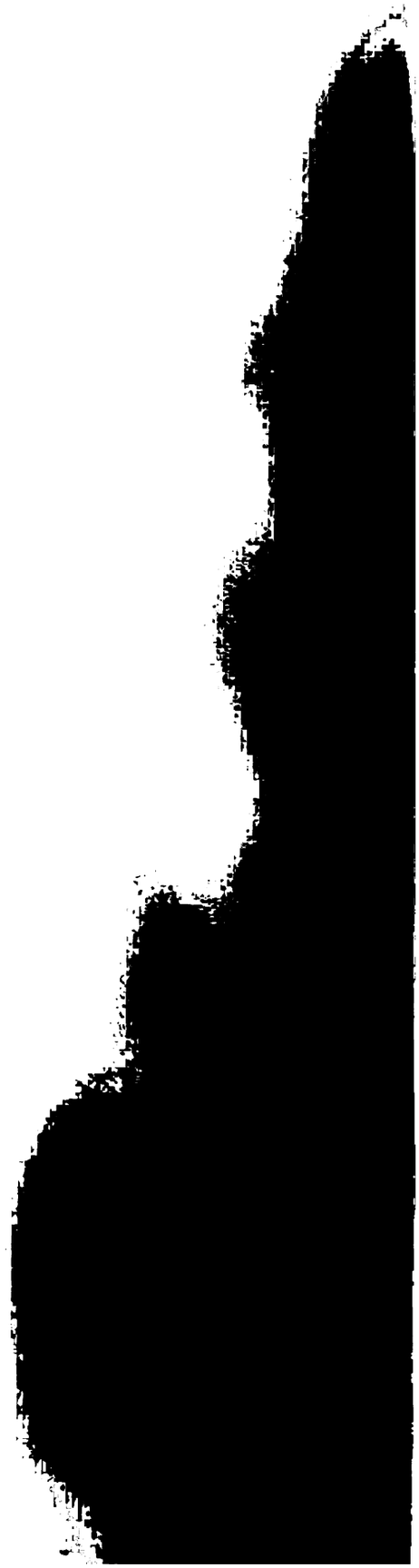

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DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY
CHARLES D. WALCOTT, DIRECTOR

THE

SOUTHERN APPALACHIAN FORESTS

BY

H. B. AYRES and W. W. ASHE

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LETTER OF TRANSMITTAL.

DEPARTMENT OF THE INTERIOR,
UNITED STATES GEOLOGICAL SURVEY,
Washington, D. C., March 7, 1904.

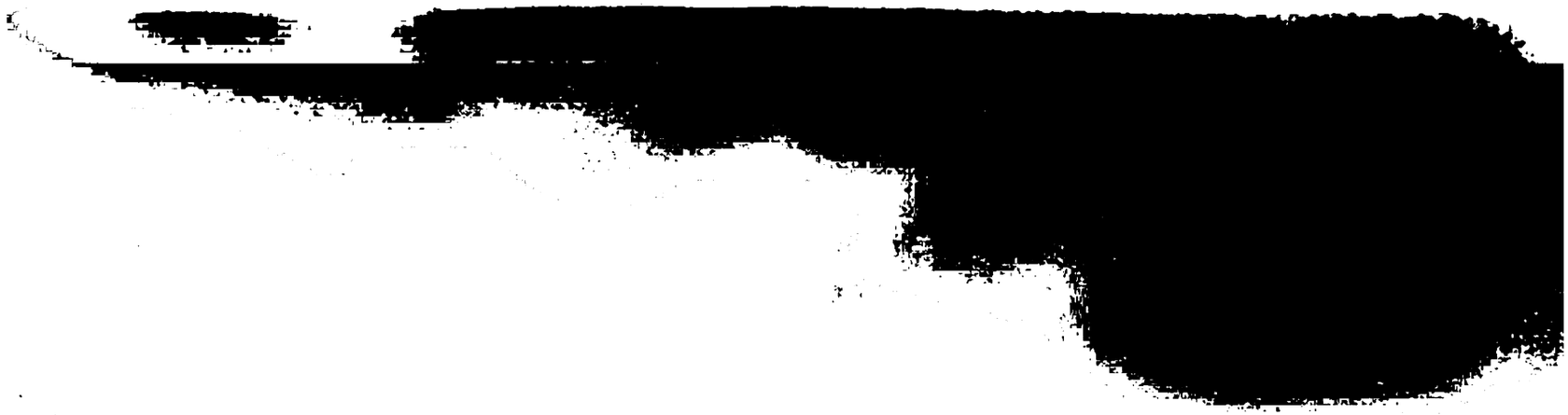
SIR: I have the honor to submit herewith, for publication as a professional paper, a report upon the examination of the forest conditions of a large area in the Southern Appalachian Mountains, made in 1900 and 1901, by Messrs. H. B. Ayers and W. W. Ashe.

This examination was made at the joint expense and under the joint supervision of the Geological Survey of North Carolina, represented by Prof. J. A. Holmes, State geologist, of the Bureau of Forestry of the Department of Agriculture, represented by Mr. Gifford Pinchot, and of this office. While the three offices named share the responsibility for the matter of the report, the form of its presentation is due to this office alone.

Very respectfully,

HENRY GANNETT,
Geographer.

Hon. CHARLES D. WALCOTT,
Director United States Geological Survey.



THE SOUTHERN APPALACHIAN FORESTS.

By H. B. AYRES and W. W. ASHE.

INTRODUCTION.

In examining so large an area it was found that the best results could be obtained by traversing the roads and trails and making side trips wherever necessary to cover intermediate territory.

Upon the topographic maps of the Geological Survey were drawn the outlines of cleared land and the several classes of forest land as they were passed. At the same time ocular estimates of the average stand and the proportion of the species composing it were made, checked occasionally by actual measurements on small representative areas. After the outlines of the several classes of land were drawn the areas were computed from the map, and the yield obtained by multiplying the number of acres of each class by the average stand. The yield is stated in feet B. M. of log timber, and cords of small wood (which includes all wood not classed as log timber).

The estimates of log timber were based upon the closest cutting in practice in the United States, and include a great deal of material that is not now salable on the stump, because of the difficulty of transportation. In fact, a very small proportion of the amount estimated (probably not over 10 per cent) is merchantable under present conditions, though all would be merchantable if cheap transportation should make it accessible.

LOCATION.

The portion of the Appalachian region under consideration extends from Virginia southwestward, and comprises parts of North and South Carolina, Tennessee, and Georgia, between the Piedmont Plateau on the southeast and the Appalachian Valley on the northwest. In consists of two parallel mountain chains, the Unaka on the northwest and the Blue Ridge on the southeast, and the intermediate mountains and valleys, some parallel and others at right angles to the Blue Ridge.

This region includes the most prominent geographic features of the Southern States, and has a very important influence on the climate and the water and timber supply of all the territory between Ohio River and the Atlantic and Gulf coasts. It is thus of economic interest to the population far beyond its borders.

The region examined in 1900 and 1901 comprises an area of approximately 10,000 square miles between New River Gap in Virginia and Hiwassee River in western North Carolina and northern Georgia, having an approximate length of 190 miles and a varying width of 35 to 65 miles. Of this area, 8,300 square miles were examined with reference to the cleared and burned areas, the density of the forest, and the timber resources.

RELIEF.

This is a mountainous region of considerable elevation. The Piedmont Plateau has at its eastern base an elevation of 1,000 feet, and the Appalachian Valley of Virginia and Tennessee at the northwest base has an elevation of 1,000 to 2,000 feet.

The mountain peaks of this region are the highest in the United States east of the Rocky Mountains. The highest is Mount Mitchell, which has an elevation of 6,712 feet. Over 40 peaks and approximately 6,400 acres of land, distributed along the Blue Ridge, the Unakas, and the intermediate highlands, have an altitude of over 6,000 feet, and about 54,000 acres are above 5,000 feet. The peaks are seldom precipitous, and their profiles, instead of being angular and serrate, are rounded and softened by age.

In the Unakas the summits are capped by hard quartzite, and the principal topographic features between Nolichucky River and White Top Mountain, Virginia, are parallel northeast-southwest ridges. On the Blue Ridge, about Highlands and Toxaway, ridges transverse to the general trend of the Blue Ridge are carved from great masses of granite, whose bare and steep slopes add variety to this portion of the region. In the upper Watauga and New River basins the configuration of the interior mountains is that of a choppy sea, due to the resistance offered to erosion of ledges of schist and gneiss, which cap the summits.

The present topography is the result of long-continued erosion. The harder and more durable rocks remain on the tops of the mountains, while the softer and less durable strata have been worn away.

Prominent in the topography of this region are the gorges cut through the mountain ranges by the streams. These are deepest near the foothills, where the rivers pass the last mountain barriers. Deep gorges divide the Unaka Mountains into several segments. The most notable of these gorges are on New River above Ivanhoe, Va.; on Laurel Fork of the South Fork of Holston River near Damascus,

Va.; the Watauga gorge and the two gorges of Doe River above Elizabethton, Tenn.; the Nolichucky gorge above Unaka Springs, Tenn.; the French Broad gorge near Hot Springs, Tenn.; the several gorges on Big Pigeon, Little Tennessee, Nantahala, and Hiwassee rivers in North Carolina; on Tallulah River at Tallulah Falls, Ga., and the Linville gorge on Linville River, North Carolina. Above the gorges are valleys or basins having slopes moderate enough to be arable. Above these valleys are canyons cut by swift creeks flowing down the mountain sides, and above the canyons are "coves" or small basins, usually well up on the mountain sides, where the brooks or "branches" unite to form the creeks.

DRAINAGE.

This region is drained by many rivers, most of which rise in the Blue Ridge and flow outward from the mountains in all directions—New River through the Kanawha into the Ohio; the Holston, Watauga, French Broad, Big Pigeon, Little Tennessee, and Hiwassee into the Tennessee; the Coosa and Etowah through the Alabama and Chattahoochee into the Gulf; and the Tallulah, Chatooga, Toxaway, Saluda, First and Second Broad, Catawba, and Yadkin into the Atlantic through the Savannah, Santee, and Peedee.

The descent of these streams is necessarily very rapid. Heading at altitudes of 3,000 to 6,000 feet and leaving the highlands at 1,000 to 2,000 feet, they must fall 2,000 to 4,000 feet within the mountain region. This descent is in great part accomplished by cascades, but after they leave the mountains the streams are much less rapid.

It is estimated that the power that could be developed on these rivers amounts to 1,000,000 horsepower.

SETTLEMENT.

The population of this tract is about 318,000, almost entirely white. There are about 440 miles of railroad, 50 miles of tramway, and 5,000 miles of wagon road, much of which is bad and, during the frequent rains, impassable. One million two hundred and seventy-two thousand acres of land, or 24 per cent of the area under consideration, have been cleared of forest and are now in various stages of cultivation or abandonment.

NATURAL RESOURCES.

The distinctive factors which give value to this mountain region are as follows: (1) A temperate and healthful climate; (2) grand and varied scenery; (3) an ample supply of pure, cool water; (4) abundant water power; (5) mineral deposits of iron, copper, mica, talc, gold, corundum, precious stones, kaolin and other clays, building stone, etc.; (6) soils that are in general of good physical and

chemical composition; (7) a vast extent of forest, principally hard wood, consisting of 137 species of trees, many of which yield lumber and bark.

Up to the present the resources have been developed by individuals without economic plan or regard to community of interest. The result has been a great waste and an unsatisfactory, often deplorable, lack of advancement.

CLIMATE.

In general the climate of this elevated region resembles that of northern Virginia, southern and central Pennsylvania, and New Jersey; the most notable difference being that the temperature, especially on the southeastern slope, where it is somewhat regulated by oceanic air currents, is more uniform. In the central and especially the northwestern portions the climate is more variable. Destructive winds are rare and much less frequent than in the Northern States.

The temperature of the regions above 5,000 feet usually ranges in summer between 45° and 75° F., and in winter between −10° and 45°, varying much between the northeastern and southwestern ends and the northwestern and southeastern sides of the mountains.

This is a region not only of sudden and heavy downpours of rain (8 inches has been known to fall in eleven hours), but the frequently prevailing southeast winds cause long periods of wet weather, and not uncommonly twenty or more rainy days occur in one month. The annual precipitation, according to the United States Weather Bureau, ranges from 40 to 50 inches on the northwestern slopes and 60 to 70 inches on the southeastern, and it is probable that near the crests of the mountains, where no records have been kept, the rainfall is even greater.

The water supply of all the region between Ohio River and the Atlantic and Gulf coasts is affected by the heavy rainfall in these mountains.

SCENERY.

The scenery of this region is more striking because it is in marked contrast to the surrounding lowlands. From the escarpments of the highlands may be obtained views of the broad expanse of the plains; along winding mountain roads and trails are seen cosy coves and mountain valleys under cultivation; from the summits of the remoter "balds" one looks over vast stretches of unbroken, billowy forest land. This is not an alpine region, and it does not rival the Rocky Mountains, the Cascade Range, or the Alps in grandeur, but it has peculiar and distinctive scenic attractions. Many thousand people now visit these mountains each year, and the economic value of this scenery will constantly become greater.

WATER SUPPLY.

Except along the crests of the ridges, one can hardly travel a quarter of a mile in an undisturbed portion of the forests without finding pure, cool water. These waters filter through moss and leaves a short distance, then follow the clean, stony bed of the brook down the mountains.

On pasture land, however, whether wooded or cleared, the trampling of cattle in the stream makes the water muddy and impure with earth and excrement, and reduces the filter of leaves, moss, and grass that holds back the impurities. Because of the rapidity with which the water flows from smooth, steep slopes, the streams from the mountain clearings are notably inconstant. Springs are frequent and many of them, especially in the wooded region, are pure, cool, and perpetual. In general the streams from the forested portions of the mountains are suitable for all uses, but those from pastures and clearings, and especially those that follow roads, are impure.

The abundant rainfall supplies the numerous streams with a large amount of water, but it is difficult to use the water for power, as there are no natural reservoirs, and the inconstancy of the streams may cause the supply to fall short or increase it to a destructive torrent. Variation in stream flow has been notably increased by the clearing away of the forest near the sources of the streams.

Water power is used in almost every settlement for grinding and sawing, but the greater portion of the 1,000,000 horsepower estimated to be available on the streams rising in these mountains remains undeveloped.

AGRICULTURE.

Agriculture and grazing are more or less successful industries, limited principally by the steepness of the mountain slopes and their liability to erosion, and also by the cost of clearing, the distance from market, and the difficulty of maintaining roads.

The principal crops are grass and corn, but the small grains, fruits, and vegetables usually thrive. Apples and cabbages grown in this region are remarkably fine. Sorghum and sweet potatoes are commonly grown in the mountains, while along the southeastern slope of the Blue Ridge fields of cotton are occasionally seen.

During the past one hundred years of settlement about 1,272,000 acres, or 24 per cent of the whole area, have been cleared. The first clearings were usually made on smooth and productive land, but the increase of population and the rapid exhaustion of the soil have led to the successive clearing of new fields farther up the mountain sides, beyond the limit of profitable cultivation. This system of progressive exhaustion and abandonment of the land has led to great

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and widespread erosion, by which thousands of acres are now gullied and as worthless as the "bad lands" of the West.

THE FOREST.

The original forest of this region, as indicated by the preserved remnants and by the accounts of the old settlers and early explorers, was wonderful in the extent, density, size, and quality of its timber trees, and the variety of their species.

INJURY TO THE FOREST.

The three agencies that have wrought changes in the forests of the Southern Appalachians are fires, lumbering, and clearing of lands for farming.

FOREST FIRES.

More than 78,000 acres of the region examined have recently been so severely burned as to kill the greater portion of the timber, but greater damage has been done by light fires creeping through the woods year after year, scorching the butts and roots of timber trees, destroying seedlings and forage plants, consuming forest litter and humus, and reducing the thatch of leaves which breaks the force of the rain. Evidence of such fires is found over approximately 4,500,000 acres, or 80 per cent of the entire area.

The effect of forest fires is seldom appreciated, especially in this region, where so few timber trees are killed. The killing of mature timber trees is, in fact, the least serious evil, as for each mature tree killed a dozen saplings would spring up if the fires did not affect the saplings much more than the large, thick-barked trees. In fact, where spring fires are habitual seedlings can not grow, as they are killed when very small. Under such conditions a forest can not reproduce itself. The timber trees die out and are replaced by brush that sprouts from the roots.

The destruction of the earth cover not only facilitates erosion, but also prevents water from penetrating and being stored in the earth. The roots of trees penetrate deeply into the subsoil, and as they decay leave a network of underground water channels. The mulch of forest leaves encourages numerous ground-boring worms and beetles that keep the soil of an unburned forest porous. If the soil is porous, water is absorbed, and its capillary rise to the surface and loss by evaporation are prevented. The mosses and humus of a well-conditioned forest form wet blankets, often a foot thick, the function of which is apparent.

The dissipation of the chemical elements of plant food into the atmosphere by fire and the rapid leaching away of the slight residue contained in the ashes is another injurious effect of the forest fires.

LUMBERING.

In many places the mountain forests surviving the fires have been protected by the difficulty of access. In recent years, however, the advancing price of lumber has stimulated lumbering, and now some of the remoter mountain coves are furnishing choice lumber for the principal markets of the Eastern States and of Europe.

Lumber is manufactured principally by small portable mills, most of which use steam power. There are a few mills having a capacity of 50,000 feet a day or more, as at Lenoir, Pinola, and Nantahala, N. C.; Elizabethton, Johnson, Crandall, and Sutherland, Tenn.

Tanneries using chestnut, oak, and hemlock bark are located at Lenoir, Morganton, Asheville, Marion, Hazelwood, Waynesville, Andrews, and Murphy, N. C.; Maryville, Sevierville, Newport, and Johnson, Tenn., and Damascus, Va.

At present lumbering and bark peeling are culling processes. In most places the continuity of the forest has not been broken, as only the most valuable of the trees have been taken out and serious fires have not often followed. Fires are much less prevalent and destructive in this region than in the coniferous forests, and wherever they have been kept out the forest has quickly covered the ground again after lumbering.

The lumberman is increasing his activities at a rapid rate and is yearly going farther into the forests. The removal of trees utilized by the lumberman does not damage the forest as much as does the destruction of other trees and seedlings of valuable species in lumbering operations. Furthermore, the tops and other brush scattered through the forest increase the danger of severe forest fires. By irregular cutting conservative forest management is rendered impracticable.

CLEARED LAND.

Surpassing both fire and lumbering in the completeness and permanency of the damage done is the clearing for ordinary agricultural purposes of mountain lands which are not worth cultivating and should forever remain in forest. The clearing of lands in this region for agricultural purposes has progressed slowly but steadily during the past century, as the population increased. When it is considered that the settlement of this region has been in progress for more than a century, the area devoted to agriculture is small. The reason for this is found in the unprofitableness of cultivating lands with such steep slopes. The cleared lands are mostly alluvial bottoms along the streams, rounded valley hills, lower mountain ridges, and lower slopes of the larger mountains below an elevation of 4,000 feet.

In some localities, especially in the region around Roan Mountain and the

Blue Ridge, north of Gillespie Gap, there are large areas of cleared land at an elevation of from 3,500 to 5,000 feet, but these are largely grass farms, and are not subject to continuous tillage like the corn lands below, and hence do not deteriorate so rapidly. Some of the cultivated fields slope at an angle of 30° to 40°, and some of them are even too steep for the mountain steer and bull-tongue plow.

By far the greater part of the timber that has been cut has been burned during the process of clearing land; another large portion has been used for fencing and buildings, while only a small proportion has reached the general market.

Estimates of these amounts can be only approximations based on the average original stand on the land now adjoining cleared and culled land and on the reports of old settlers. On this insecure basis the opinion is ventured that no less than 10 billion feet of log timber such as is now valuable in the lumber market have been burned, while about 5 billion feet have been used for fences and buildings, and only about 3 billion feet have reached the market. Besides this consumption of log timber about 1,272,000 cords of small wood are annually consumed for fuel.

In clearing the land for cultivation the standing trees are girdled and killed so that neither their shade nor their growing roots will injure the crops. Some of the trees thus killed are used for fencing and fuel, but the greater number of them fall in a few years and are burned. Corn or buckwheat is usually grown on these newly cleared fields during the first season. Following this, corn may be planted one or two years more, then small grain, either wheat, rye, or oats, for one or two years; then grass for a few years; finally worthless weeds take possession, and then the land is abandoned. When first cleared most of this mountain land is covered with a layer of humus several inches thick, and the soil below is black and porous owing to the large percentage of vegetable matter. But on cultivation and exposure to the sun and washing rains this organic matter rapidly disappears and the soil loses its fertility, as most of it is washed away, the remainder shrinks and consolidates, thus losing much of its power to absorb water rapidly.

A few years of cultivation usually brings the fields on these mountain slopes to the end of their usefulness for agricultural purposes. This may be followed by a few years of pasturage, and then come abandonment and ruin. Over the eroded foothills, along the eastern base of the Blue Ridge and the western base of the Unakas, a growth of young pines may cover the mountain slope, but over the more elevated portion of the Appalachian Mountain region erosion is so rapid that the slow-growing hard-wood forests do not readily regain their footing.

There are yet many places where the gentler slopes might perhaps be cleared to meet the local agricultural demands of the region, but unquestionably the

steeper areas already cleared should be at once reforested in order to prevent their ruin. All lands remaining cleared for farming purposes should be kept in the highest state of cultivation, and even those on the gentler slopes should be carefully terraced and as far as possible kept in grass or orchards.

The effect of exposing mountain lands to the full power of rain, running water, and frost is not generally appreciated. During heavy rains the earth of freshly burned or freshly plowed land is rapidly washed away. The streams from such lands are often more than half earth, and the amount of soil thus eroded every year is enormous.

The individual owners are to a great extent helpless in preventing these unwise cuttings, clearings, and forest fires. Some of them can care for their own lands, but they can not, owing to their small holdings and small incomes, regulate the policy which controls adjacent areas. Only cooperation on a large scale, such as government ownership could provide, can stop these forest fires, check this reckless clearing, and preserve these resources to the best advantage.

GRAZING.

The question of grazing is a very important one. Even woodsmen and herders acknowledge that great damage is done by it. The ground is hardened by the tramping of cattle, while the roots of the trees are bruised and broken by the stamping of the animals in fighting flies or crowding around watering places. Where such conditions have prevailed a long time the forest is decrepit and sparse. Young growth has been prevented, and the hardening of the ground and the removal of débris and humus have promoted a rapid run-off of rain water and prevented its percolation into the ground as a reserve for dry times.

On the other hand, grazing is one of the chief means of subsistence of the people of the mountains and of the surrounding regions. Cattle, sheep, and horses furnish almost the only cash income of the mountaineers, who usually have some to sell every fall. These are turned loose in the mountains to roam at large. Except for the time used in finding them and salting them about once a week they are raised at little cost. When the range is good and near at hand the care of the stock is not usually great, but when it is far away or so poor as to render the stock discontented, the time necessary to find and keep them together would often amount to more than they are worth, if time and labor were properly valued.

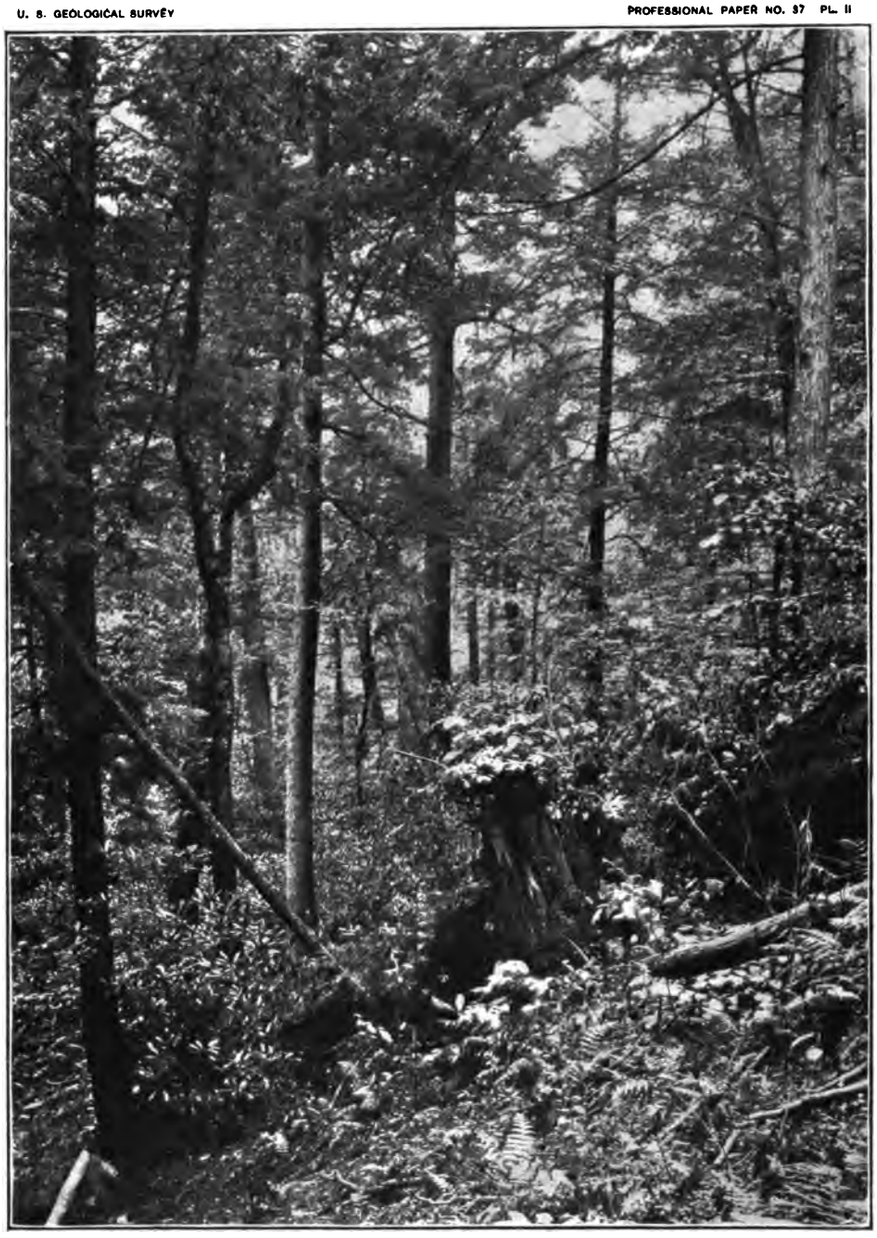
In much of the Smoky Mountain region ranging at large is still profitable. But southward, along the Blue Ridge, the range has been so reduced that most farmers and stockmen prefer to fence their pastures, and they favor the so-called "no-fence law," which prohibits cattle from running at large. The amount of

stock held and the importance of the industry in a representative portion of the region examined is shown in the following table:

Approximate population and number of cattle, sheep, and swine, by counties, in representative areas examined.

[Estimates based on census of 1900.]

Counties.	Areas examined.	Improved land.	Population.	Cattle.	Sheep.	Swine.
	Sq. miles.	*Sq. miles.*				
Ashe, N. C	24	4.25	523	575	471	680
Blount, Tenn	200	14.25	1,753	1,928	1,577	2,279
Buncombe, N. C	484	37.00 240.50	36,101	14,072	4,750	13,825
Burke, N. C	138	6.00	792	871	713	1,030
Caldwell, N. C	252	37.50	4,612	5,074	4,151	5,996
Carter, Tenn	40	11.25	1,485	1,633	1,336	1,930
Cherokee, N. C	108	18.75	2,625	2,887	2,362	3,412
Clay, N. C	135	24.25	3,395	3,734	3,055	4,413
Cocke, Tenn	56	6.25	781	859	692	1,015
	184	25.00	3,125	3,437	2,812	4,062
Graham, N. C	302	26.75	4,343	4,636	3,754	5,547
Green, Tenn	252	25.50	3,136	3,450	2,822	4,076
Greenville, S. C	44	2.75	344	275	344	447
Habersham, Ga	60	6.00	750	600	750	125
Haywood, N. C	505	101.00	14,986	13,887	8,000	15,000
Henderson, N. C	12	.50	75	60	50	67
Jackson, N. C	422	43.75	9,480	8,284	6,596	11,220
McDowell, N. C	200	25.50	4,000	2,000	850	3,600
Macon, N. C	435	44.00	9,000	7,330	830	12,600
Madison, N. C	431	86.25 59.75	20,644	21,676	629	35,950
Mitchell, N. C	362	87.00	15,221	10,350	6,[illegible]	11,415
Oconee, S. C	72	2.75	363	121	[illegible]	[illegible]
Pickens, S. C	44	.75	30	30	[illegible]	[illegible]
Rabun, Ga	344	42.50	6,285	4,965	[illegible]	8,484
Sevier, Tenn	228	18.75	11,011	6,630	[illegible]	9,100
Swain, N. C	560	24.00	8,401	4,200	[illegible]	6,720
Towns, Ga	108	19.50	2,600	1,820	[illegible]	3,000
Transylvanica, N. C	179	10.75	1,397	1,[illegible]	[illegible]	1,955
Unicoi, Tenn	144	23.75	4,000	[illegible]	1,[illegible]	2,400
Washington, Tenn	34	10.50	1,291	420	1,162	1,680
Watauga, N. C	240	50.00	8,000	7,000	8,000	6,400
Wilkes, N. C	128	6.00	2,800	1,680	980	2,600
Yancey, N. C	302	77.00	11,464	8,024	6,000	10,318
Total	7,029	1,220.00	184,813	145,888	87,097	194,516



ORIGINAL FOREST, NORTHWEST SLOPE OF GREAT SMOKY MOUNTAINS, TENNESSEE.

It will be noticed that the table shows an average of 0.75 cow, 0.45 sheep, and 1 hog to each person. This tabulation, however, includes the towns and the densely populated farming regions along Toe, French Broad, Pigeon, and Little Tennessee rivers, which should unquestionably be excluded from a reserve.

Grazing at large in the mountain forests should not be prevented until the value of mountain timber and the injury by grazing is recognized by the land-owners, who should then be supported if they desire to prevent grazing upon their land. In considering this question it is important to remember that thorough protection against fire would be necessary were grazing stopped, for the accumulated vegetation would furnish a dangerous amount of fuel. The effect of the "no-fence law" in this respect is to be seen very plainly south of Chattooga River, where fire in the accumulated débris has greatly injured the forest; but it should be remembered that in the region south of the Blue Ridge droughts are more common and fires much more frequent than in the mountains.

THE REMAINING FOREST.

As shown in the accompanying tables (pp. 52, 53) there are on the tract examined 4,100,856 acres of woodland, on which are standing, including everything above 4 inches in diameter, 10,824,963 M feet B. M. of log timber, and 69,038,817 cords of small wood. The principal species composing the log timber and their proportions relative to the entire yield are shown in the table on pages 55, 56. The oaks, of which the principal species are white, red, yellow, chestnut, Spanish, and spotted, constitute by far the greater portion of the timber. These oaks are found mostly on the ridges, especially on the southward and lower and drier slopes, where they grade into the pine forests of the plains. Toward the mountain summits the red oak prevails and is often almost the only oak on the higher crests. The best development of individual oaks is reached in the coves, where, though circumstances are less favorable to reproduction because of crowding, the few trees that do overtop their neighbors usually attain large size and good quality. White and red oak logs 4 feet in diameter are not uncommon. Next in abundance is the chestnut, constituting over 17 per cent of the forest. It also is most abundant on the ridge lands, but on such lands it is usually wormy. It is sparsely distributed on north slopes and deep coves, where, however, it is of better quality. Hemlock lines many of the ravines and is a common tree on the well watered portions of northward slopes. It is most abundant between altitudes of 3,000 to 5,000 feet. White pine is found as a valuable timber tree over the entire area, but is most abundant along the Unaka Range and portions of the highlands where in mixture it sometimes yields 60 M feet B. M. per acre.

Poplar has a wide distribution, but few timber trees of this species are found together, although almost every hollow of the original forest contains more or less timber trees. Buckeye, beech, birch, maple, cucumber, and linn are most prevalent on northward exposures, especially northwest of the Blue Ridge. Shortleaf and pitch, or black, pine, and the hickories are most prevalent southward along the lower slopes of the Blue Ridge.

REFORESTATION.

A remarkable feature of this forest is its reproductive power, which is greater here than in any other region in the Eastern or Northern States. This power of reproduction will enable the forester to secure a valuable stand without much planting, and judicious cutting will, in most cases, be sufficient.

The most promising species for rapid returns is white pine. It is found as a timber tree over the whole tract, though less abundant on the southeastern slope of the Blue Ridge. In the natural forest it rarely forms a pure stand but is usually mixed with hard woods—the most favorable condition for a good quality of timber. It grows best in oak forests somewhat reduced by fire or grazing and on land of intermediate elevation and moisture.

Shortleaf pine is the most promising soft wood southeast of the crest of the Blue Ridge. With the exception of climate the conditions favorable to the reproduction of the shortleaf are very similar to those required by the white pine. The shortleaf has a marked preference for southern exposures and a mild climate, and thus supplements in a very desirable way the territory most favorable to the white pine. The two thus supply the whole region with the most hardy, rapid growing, and valuable pines east of the Rocky Mountains.

It is notable that these species are holding the ground they now occupy under great opposition. The competition between the hard woods and the pine seedlings is intense, and if it can be relieved these two pines promise to quickly use their opportunity to make valuable timber.

In the higher altitudes, where the climate and drainage are less favorable to tree growth and access is difficult, the problem of profitable species will be hard to solve. Red and white oak, yellow birch, cherry, white ash, and black spruce are rivals there; the oaks prevail on the southward dry exposures, while on the north slopes the spruce attempts to maintain exclusive colonies against the combined efforts of the hard woods. Seedlings of spruce are abundant in the moss which commonly forms the ground cover under these species.

Here is an inviting field to determine whether some other spruce, such as the Norway, might be introduced successfully. But in applying forestry these are remote problems.

On the southward slopes of middle altitude which are too warm and dry for white pine, the oaks and chestnut will doubtless be more profitable. The reproduction of these species is so free in this region that improvement cuttings and protection from fire promise to be sufficient to secure a good stand.

In the deep dark coves and ravines where trees and undergrowth are luxuriant it would be difficult to establish pine, and in such places white ash, cherry, birch, linn, and chestnut prove the most ready of the valuable timber trees to reoccupy cut-over lands.

Locust promises to be of great value in light dry soils in medium and lower altitudes, and especially in restocking worn-out fields. It is very hardy and valuable, has an established market, and when cut sends up numerous shoots from the roots.

FUTURE OF THE REGION.

If taken in hand at once and the best methods of sylviculture applied the remaining forest would undoubtedly yield handsome returns. At present trees of choicest timber are killed to make fields on which corn costs $1 a bushel, or to be grazed until worn out and gullied by rapid erosion. On these clearings the mountaineers make only a miserable living. The markets are distant, the once abundant game is gone, the population is sparse, and the roads wretched. The material prosperity of these people depends upon the development of the one important natural resource—the forest.

If roads and railroads were built into this region, furnishing transportation at reasonable rates and making the present timber accessible where it stands, not only would the inhabitants gain a good market for their timber, but this would be worth cultivating, and remunerative employment would be assured to a much larger population than at present. The establishment of wood-working factories, for which there is abundant raw material of the best quality, would support prosperous communities.

If the region were more accessible it would soon become popular as a health resort. The altitude is high and the air of the mountains, often loaded with the resinous odor of balsam and pine, is pure, fresh, and cool. The water of the springs and forest streams is clear and healthful and the scenery is inspiring. The surrounding lowlands, especially coastward, are densely populated and suffer in summer from a hot and enervating climate, while this mountain refuge lies within easy reach.

Should this region become a vacation ground and summer resort, not only would the supplying of the visitors' needs afford profitable employment for those for whom there are now no opportunities as wage-earners, but a home market would

be furnished for many farm products, and these primitive mountaineers would be brought into contact with the outer world.

If a forest reserve were created in this region, some protection could be given to the fish and game. Trout have been dynamited, deer hunted, and turkey, quail, and pheasants slaughtered until game is nearly exterminated. Game can be thoroughly protected only by establishing a system of forest patrol. This would be too expensive merely for the protection of game, but would be almost a necessary part of forest management. The reestablishment of beaver on the numerous sources of these streams would go far toward steadying the flow and preventing floods.

TREE SPECIES.

White pine (*Pinus strobus*).—This tree reaches a height of 160 feet and a diameter of 40 inches, and forms nearly pure groves or is associated with smaller hard woods. It prefers sandy or gravelly soils on northwest slopes lying between 1,700 and 4,000 feet. It is the most important timber tree of eastern United States. Its wood is light, strong, and durable, and is applied to nearly all uses. It grows rapidly and reproduces freely. It is most abundant, attains its maximum size, and grows most rapidly on the western slopes of Smoky and Iron mountains.

Loblolly pine (*Pinus tæda*).—In the Appalachians the loblolly pine reaches a height of 80 feet and a diameter of 30 inches. It is found only in the southernmost part of the region, below an elevation of 1,200 feet. It occurs chiefly as a second growth in old stands, and is of great value in restocking them and preventing erosion. Nearer the coast it is a timber tree of the first importance.

Shortleaf pine (*Pinus echinata*).—The shortleaf pine reaches a height of 100 feet and a diameter of 36 inches. It is found on well-drained soil below 2,000 feet, becoming more common as the altitude decreases. The wood is yellow, strong, and very durable, and takes a fine finish. The species seeds freely and reproduces abundantly under full light, often restocking old stands and waste places. It is one of the most valuable of the yellow pines, and forms the chief building material over much of this region.

Black pine (*Pinus rigida*).—The black pine reaches a height of 90 feet and a diameter of 28 inches. It is associated with the shortleaf pine, but is more abundant than that tree at higher elevations. Like the shortleaf pine, it seeds freely and often and restocks waste lands. It is not so large nor so valuable, however, and the wood is coarser, more resinous, and not so free from knots. It is much used as a building material.

Table Mountain pine (*Pinus pungens*).—The Table Mountain pine is a medium-sized tree, which reaches a height of 70 feet and a diameter of 24 inches. It occurs on dry, rocky ridges between 1,500 and 3,000 feet, and is most common

along the Blue Ridge and on the Chilhowee and Holston mountains. It reaches its greatest size in the mountains of western North Carolina. It is not so large nor so valuable a tree as the shortleaf and black pines. Its wood is coarse and sappy. The species will grow on dry, rocky soil, where the black pine does not. It seeds freely and makes good growth, at least when young.

Scrub pine (*Pinus virginiana*).—The scrub pine is a slender tree, seldom more than 80 feet in height and 18 inches in diameter. It is common on dry sandy or gravelly land below an elevation of 2,000 feet. It propagates freely and makes rapid growth. It is not large enough to be of importance as a timber tree, though it is occasionally sawed.

Black spruce (*Picea mariana*).—The black spruce is a slender tree, reaching a height of 150 feet and a diameter of 30 inches. It seldom grows below an elevation of 4,000 feet. It is found around only a few of the highest mountains, where it forms dense forests of pure growth, or is associated with hemlock on northern slopes or along streams. It seeds at intervals of several years and reproduces freely if afforded the proper light and soil conditions, which are generally not found in areas where lumbering has been carried on. The wood is light and strong and is largely used for lumber. It is the chief source of wood pulp for paper. The species is one of the most valuable trees, and reaches its greatest individual development on the slopes of the Smoky Mountains.

Red spruce (*Picea rubra*).—The red spruce is here a small tree, seldom reaching 30 feet in height, and unimportant. It occurs only in a few mountain swamps.

Hemlock (*Tsuga canadensis*).—Hemlock is one of the largest trees of eastern United States. In the Southern Appalachians it attains a height of more than 140 feet and a diameter of 5 feet. It is common along streams and on cold, wet northern slopes above an elevation of 1,500 feet. The bark is extensively used in tanning, and the trunk supplies much rough lumber. It seeds frequently, but reproduction is poor, as good reproduction requires a delicate adjustment of light and moisture conditions.

Carolina hemlock (*Tsuga caroliniana*).—The Carolina hemlock is a smaller tree than the preceding species, and its distribution is limited to a few localities in the Southern Appalachians. The greatest size is attained in the mountains of North Carolina. It is one of the most stately of American conifers.

Balsam (*Abies fraseri*).—The balsam attains a height of 60 feet and a diameter of 24 inches. It is exclusively a Southern Appalachian tree, being confined to the summits of the highest mountains, from Clingmans Dome northeastward. The maximum development is attained on the high peaks of the Black Mountains.

The wood is soft and brittle and of little value. A medicinal resin, balsam, is obtained from its bark.

Arbor vitæ (*Thuja occidentalis*).—The arbor vitæ is a small tree which occurs in the Southern Appalachians at only a few places, as on Cripple Creek and Linville River, on limestone soil.

Red cedar (*Juniperus virginiana*).—The red cedar is a small tree, seldom more than 50 feet in height, which is frequent below an elevation of 1,500 feet in old stands and along roadsides, especially on limestone soil at the foot of the western slope of the Smoky Mountains. The wood is soft, but durable and valuable. The species reproduces freely, but grows slowly.

Butternut (*Juglans cinerea*).—The butternut is a short-stemmed tree reaching a height of 70 feet and a diameter of 24 inches. It is frequent on rocky soil along streams between 1,500 and 4,000 feet. It yields a valuable light-brown cabinet wood. Seed is borne at frequent and regular intervals and reproduction is good.

Black walnut (*Juglans nigra*).—The black walnut reaches a height of 110 feet and a diameter of 40 inches, attaining its greatest size in the deep hollows of the mountains of North Carolina, where it occurs mixed with oak and chestnut. The largest and most valuable trees have generally been removed. It seeds regularly and reproduces freely. The black, fine-grained wood takes a good polish, and is largely used in Europe for furniture.

Bitternut (*Hicoria minima*).—Bitternut is one of the largest and most valuable of the hickories, often attaining a height of 110 feet and a diameter of 30 inches. It is frequent on lower moist slopes and along streams. Seed is borne in abundance at frequent intervals, and reproduction is good. The rate of growth is rapid. The wood is hard, heavy, and tough, and is much used for the handles of tools and in wagon manufacture.

Shagbark (*Hicoria ovata*).—This tree is frequent along streams and on moist, rich slopes, where it attains a large size. It reproduces freely by [illegible] and small trees sprout from the stump. The tough, elastic wood is regarded as being second in quality among all the hickories. The large, edible nuts are extensively gathered and sold.

Carolina shagbark (*Hicoria carolinæ-septentrionalis*). This is a smaller tree than the preceding species, but its wood is of the same quality and is used for the same purpose. It occurs on sandy soil at the southwestern end of the Appalachians, below an elevation of 1,200 feet.

Shellbark hickory (*Hicoria laciniosa*).—The shellbark hickory is a large and valuable tree which is found at only a very few places. It grows on alluvial lands at a low elevation.

White hickory (*Hicoria alba*).—This is the most common hickory. It is frequent on rich warm soil at a low elevation, where it becomes a large tree, sometimes 110 feet in height and 36 inches in diameter. The hard, tough wood is preferred to that of the other species for mechanical uses. It seeds and reproduces freely, and young trees are common in culled woods at low altitudes. This and the other species are largely used for fuel.

Red-heart hickory (*Hicoria odorata*).—The red-heart hickory reaches 120 feet in height and 30 inches in diameter, and is one of the most common species. In the Southern Appalachians it is second in value and importance only to the white hickory. It prefers rich, warm soil at low elevations. It seeds often and in abundance, and reproduction is good.

Pignut (*Hicoria glabra*).—The pignut is a slender tree, exceptionally 100 feet in height. It generally grows on dry soil, and is not common. The timber is inferior to that of the red-heart hickory.

Hairy pignut (*Hicoria glabra hirsuta*).—This tree is like the preceding in size and in the character of its timber, but is not so common.

Sand hickory (*Hicoria villosa*).—The sand hickory is a small, uncommon tree, yielding a wood similar to that of the pignut. It grows on sandy soil along streams and on dry ridges at low elevations.

Black willow (*Salix nigra*).—The black willow is a small tree reaching a height of 50 feet, and is common along streams below an elevation of 3,000 feet. The wood is not used, but the tree is important, as its tough roots serve to protect from erosion the banks of the streams along which the trees grow.

Silkly willow (*Salix sericea*).—The silky willow is from 20 to 30 feet in height, with a straight stem. It is common along streams and in wet meadows below an altitude of 4,000 feet. It is too small to furnish useful wood, but as a protection against the erosion of the banks of small streams it is of more importance than the black willow. It seeds abundantly and reproduces freely.

Large-tooth aspen (*Populus grandidentata*).—This is a slender tree reaching a height of 50 feet. It is not common and the wood is not used.

Balm of Gilead (*Populus balsamifera candicans*).—Balm of Gilead has been extensively planted along streams, where it makes an excellent soil binder and protects the banks against washing. It is also useful in building up low areas along streams which are subject to flooding, as the deposit of earth around its stems during freshets does not injure the tree. The collection and sale of the large resinous buds, which are used medicinally, is an industry of some importance. It is a tree of rapid growth, and soon reaches a height of 50 feet. The wood is light, soft, and not durable.

River birch (*Betula nigra*).—The river birch reaches a height of 70 feet and

A. SCHOOLHOUSE, LITTLE TENNESSEE GAP, WESTERN END OF GREAT SMOKY MOUNTAINS, TENNESSEE.

B. FRENCH BROAD RIVER, PAINTROCK, N. C.

Scarlet oak (*Quercus coccinea*).—The scarlet oak reaches a height of 100 feet and a diameter of 30 inches, but is generally much smaller. It is very common on dry soil, especially if stiff, below an elevation of 4,000 feet. The timber is not so valuable as that of the red oak, but is much used. It reproduces freely and makes good growth.

Black oak (*Quercus velutina*).—The black oak reaches a height of 100 feet and a diameter of 30 inches, and is frequent on good soil on well-drained slopes below an elevation of 2,500 feet. The timber has about the same uses as that of the red oak. It is a tree of rapid growth and reproduces well. The bark is rich in tannin.

Southern red oak (*Quercus digitata*).—In the mountains this tree reaches a height of 80 feet and a diameter of 30 inches. It is common only below an elevation of 2,000 feet, where it occurs on dry soils generally with the shortleaf pine. It grows rapidly and seeds abundantly every few years. The bark is rich in tannin.

Bear oak (*Quercus pumila*).—The bear oak is generally a large shrub, sometimes becoming a small tree. It is unimportant as a timber tree, and not at all common.

Black jack (*Quercus marilandica*).—The black jack is a small tree, seldom more than 30 feet in height. It is found only on poor, dry soil below an elevation of 2,000 feet, and is infrequent except on the southern slope of the Blue Ridge. The wood makes an excellent fuel, but is valueless as timber.

Water oak (*Quercus nigra*).—The water oak reaches a height of 50 feet and a diameter seldom greater than 20 inches. It is found occasionally along the larger streams around the southern base of the mountains. It is not sufficiently abundant to have any specific use in this region. The wood is similar to that of the shingle oak, described below.

Shingle oak (*Quercus imbricaria*).—The shingle oak is seldom more than 50 feet in heigth. It occurs in the valleys below an elevation of 2,500 feet. The wood is coarse grained and porous, like that of the black and scarlet oaks, and is adapted to similar use. The tree seeds freely, reproduces well, and grows rapidly.

White elm (*Ulmus americana*).—The white elm reaches a height of 80 feet and a diameter of 30 inches, and occurs along only the larger streams. It is not abundant enough to be generally used. The wood is hard and tough.

Winged elm (*Ulmus alata*).—The winged elm occurs only along the larger streams, especially toward the southern end of the Appalachians. It is seldom more than 50 feet in height and 20 inches in diameter, and is unimportant as a timber tree. The wood is hard and tough.

Slippery elm (*Ulmus pubescens*).—The slippery elm reaches a height of more

than 100 feet and a diameter of more than 30 inches, and is found occasionally in rich hollows. It is too infrequent to have any commercial uses.

Late elm (*Ulmus serotina*).—The late elm is a small tree occurring on the larger streams at the southern end of the Appalachian Plateau. Its timber is similar to that of the other species, but is not used.

Hackberry (*Celtis occidentalis*).—The hackberry is a slender tree, sometimes 90 feet high and 24 inches in diameter, which occurs along the larger streams. The wood is tough and strong, but is not used. The species seeds freely and reproduces well.

Mississippi hackberry (*Celtis mississippiensis*).—This is a tree similar in size and in the character of its wood to the preceding. It occurs along the larger streams, but is not common.

Rough hackberry (*Celtis crassifolia*).—The rough hackberry is a smaller tree than the above, seldom more than 30 feet in height and 12 inches in diameter. The wood is tough and strong, but is not used.

Mulberry (*Morus rubra*).—The mulberry is a small tree with a very short stem. It is seldom more than 25 feet in height and 24 inches in diameter. The wood is tough and very durable, and is used for posts, etc. This tree is found in rich hollows at low elevations, but is in general cultivation for the fruit. It seeds regularly and abundantly and grows rapidly.

Cucumber tree (*Magnolia acuminata*).—This is a large tree, becoming 120 feet high and 60 inches in diameter. It is found along the base of the mountains, generally above an altitude of 1,500 feet. The wood is rather soft and yellow, and is largely used in the manufacture of furniture, being marketed with that of the yellow poplar. Seeds are not abundant and reproduction is scanty. The rate of growth is slow.

Yellow-flowered cucumber tree (*Magnolia acuminata cordata*).—This is a smaller tree than the preceding and is confined to the lower elevations at the southern end of the Appalachians. As a timber tree it is unimportant.

Largeleaf umbrella tree (*Magnolia macrophylla*).—This tree, seldom more than 25 feet in height, occurs at only a few places along streams or on shady slopes. It is often planted as an ornamental tree, but the wood has no uses.

Umbrella tree (*Magnolia tripetala*).—This is a small tree, very similar to the preceding, but more common.

Mountain magnolia (*Magnolia fraseri*).—This is a tree 40 to 60 feet in height, and grows along cool streams. The wood is soft and white, and is not used. The bark is used medicinally.

Yellow poplar (*Liriodendron tulipifera*).—The yellow poplar is the largest tree of the Appalachians, attaining a height of 140 feet and a diameter of 8

feet. It is common below an elevation of 3,500 feet, but is most abundant and reaches its largest size in cool, sheltered hollows on rich soil. The wood is soft and yellow, and is extensively used in the manufacture of furniture and for wood pulp. It seeds frequently and abundantly, but young trees are not very common, as a delicate adjustment of light and moisture is required for regeneration. It reproduces most freely on the partly shaded portions of old stands. It is a tree of only medium rapidity of growth.

Papaw (*Asimina triloba*).—The papaw is seldom more than 30 feet in height, growing on rich, moist soil at low elevations. It is uncommon.

Sassafras (*Sassafras sassafras*).—The sassafras reaches a height of not more than 40 feet and a diameter of 24 inches, and is common on dry, sandy soil. The red wood is hard and fine grained, and takes a beautiful polish. It is sometimes used in the manufacture of furniture. It reproduces freely in old fields on stiff soil, by seed and suckers.

Witch-hazel (*Hamamelis virginiana*).—The witch-hazel is a small tree, about 15 feet in height, or generally a slender shrub. It is common on moist soils up to an elevation of 4,000 feet. It seeds abundantly and reproduces freely. Extract of witch hazel is distilled from its bark.

Sweet gum (*Liquidambar styraciflua*).—The sweet gum is found in this area along only the larger streams at a low elevation. It becomes a tree 110 feet in height and 36 inches in diameter. The wood is red, hard, and fine grained, and is used for crates, shipping boxes, tobacco boxes, etc., and for flooring and furniture. It seeds regularly, and seedlings are not uncommon near old trees.

Sycamore (*Platanus occidentalis*).—The sycamore is a large tree, often 110 feet in height and 36 inches in diameter, common along the larger streams. The wood is hard and firm with a beautiful grain, and is used for tobacco boxes and to some extent in the manufacture of furniture. The species seeds often and reproduces freely.

Crab apple (*Pyrus coronaria*).—The crab apple is a small tree 15 to 20 feet in height, common in old fields and open woods. The wood is hard and tough and is used to some extent in turnery. It seeds abundantly and reproduces freely.

Narrowleaf crab apple (*Pyrus angustifolia*).—This tree occurs with the preceding and its wood is very similar.

Mountain ash (*Pyrus americana*).—The mountain ash is seldom more than 30 feet in height, and is found around the summits of the higher mountains. The timber is not used.

Service tree (*Amelanchier canadensis*).—This tree, seldom more than 45 feet in height and 20 inches in diameter, is common above an elevation of 2,000 feet.

The wood is hard and fine grained, and is sometimes used in turnery. The species seeds abundantly and young trees are common.

Small-flowered service (*Amelanchier botryapium*).—The small-flowered service is a tree with the same distribution and uses as the species last described.

Cockspur thorn (*Cratægus crus-galli*).—This tree, seldom more than 25 feet in height, is frequent along roadsides and in fields. The wood is not used.

Blue Ridge thorn (*Cratægus multispina*).—This species becomes 25 feet in height and 10 inches in diameter, and is frequent in fields and on roadsides along the Blue Ridge. It is unimportant as a timber tree.

Black thorn (*Cratægus tomentosa*).—This is a small tree, seldom 20 feet in height, which occurs along streams. It is unimportant as a timber tree.

Chapman thorn (*Cratægus chapmani*).—This species is very similar to the last described in size and distribution.

New River thorn (*Cratægus neo-fluvialis*).—This tree occurs along streams in the northern part of the plateau. It is not common, and is unimportant as a forest tree.

Washington thorn (*Cratægus cordata*).—This species is very frequent on dry soil at low elevations. Unassuming in size, it is a beautiful ornamental tree.

Spatulate thorn (*Cratægus spathulata*).—This tree is frequent on dry soil at low elevation around the base of the plateau.

Parsley thorn (*Cratægus apiifolia*).—This is an infrequent tree, about 20 feet in height, occurring on dry soil around the base of the plateau.

Tree thorn (*Cratægus viridis*).—This species reaches a height of 35 feet and a diameter of 15 inches. It occurs along the larger streams below an elevation of 1,500 feet.

Dotted thorn (*Cratægus punctata*).—The dotted thorn is common along cold streams and around the summits of the high mountains.

Golden thorn (*Cratægus crocata*).—The golden thorn is very much like the last-described species and has the same distribution.

Hill thorn (*Cratægus collina*).—This species becomes 25 feet high and 12 inches in diameter. It is frequent in fields and in open, dry woods to the south of Asheville.

Buckley thorn (*Cratægus buckleyi*).—The Buckley thorn is a slender tree, sometimes 30 feet in height, which occurs along streams at low elevations, especially in the valley of French Broad River.

Catawba thorn (*Cratægus catawbiensis*).—This is a small bushy tree occurring along streams on the east slope of the Blue Ridge.

Pruinose thorn (*Cratægus pruinosa*).—The pruinose thorn is a small tree,

seldom 20 feet in height, with a short trunk. It occurs on dry hills, especially along the Blue Ridge.

Boynton thorn (*Cratægus boyntoni*).—This tree is seldom 20 feet in height. It is common on dry hills, especially in the valley of French Broad River.

Wild plum (*Prunus americana*).—The wild plum is a small tree, which is common in open woods and fields below an elevation of 4,000 feet. Its edible fruit is borne often and in abundance. The wood has no uses. It is the parent stock of many of the cultivated plums.

Chickasaw plum (*Prunus angustifolia*).—This is a small tree much like the last-described species. It is the parent of many cultivated varieties.

Fire cherry (*Prunus pennsylvanica*).—This species becomes 40 feet in height and more than 12 inches in diameter. It occurs in cold, damp woods around the high mountains, and often forms extensive groves of pure growth on burned spruce lands, where it prepares the soil for another growth of spruce. The wood is soft and brittle. Seed are borne abundantly and frequently. The growth is rapid.

Wild cherry (*Prunus serotina*).—Along streams at a low elevation the wild cherry is small, but on moist land at high elevations it reaches a height of 100 feet or more and a diameter of 36 inches. The red wood is hard, takes a fine polish, and is extensively used for interior finish, and was used for furniture until it became too rare. The rate of growth is rather slow. It seeds often, but young growth at high elevations is uncommon. The best trees have generally been removed.

Redbud (*Cercis canadensis*).—The redbud is a small tree about 15 feet in height. It occurs along the edges of woods, or on rocky banks of streams, seldom above an elevation of 2,000 feet. The wood is not used.

Honey locust (*Gleditsia triacanthos*). The honey locust is a tree reaching a height of 60 to 70 feet and a diameter of 24 inches. It was introduced into this region from middle Tennessee, but is thoroughly naturalized and propagates freely in old fields and waste places. The wood is not used, though it is tough, strong, and durable.

Coffeetree (*Gymnocladus dioicus*).—This is seldom more than 40 feet in height. It occurs in fertile valleys at the foot of the western slope of the Smoky Mountains. The wood is not much used. It reproduces well.

Yellow-wood (*Cladrastis lutea*).—This species is seldom more than 30 feet in height and 12 inches in diameter. It occurs in rich hollows at low elevations at the southwestern end of the Appalachians. The hard yellow wood takes a fine polish.

Locust (*Robinia pseudacacia*).—The locust is a slender tree, sometimes 100

feet in height and 30 inches in diameter. It is frequent below an elevation of 4,000 feet on rather dry, yet shaded and deep soil. It seeds abundantly and reproduces freely by sprouts, suckers, and seed. The hard yellow wood is very durable in contact with the soil, or on exposure, and is extensively used for fence posts, sills, bridge timber, and insulator and ship pins. It is a most valuable tree, but is often attacked by a fungus which destroys the heartwood.

Clammy locust (*Robinia viscosa*).—The clammy locust is a small tree, 20 to 30 feet in height, with a short stem, or generally a large shrub found wild only in the southeastern part of this area. It is highly prized as an ornamental plant on account of the beauty of its flowers, and is extensively cultivated. Its wood has no uses. It seeds frequently and reproduces freely, both by seed and suckers.

Prickly ash (*Xanthoxylum clava-herculis*).—The prickly ash becomes 25 feet in height and 12 inches in diameter, and is frequent along streams. The wood is not used. An extract from the bark is used medicinally. It seeds abundantly and reproduces freely.

Ailanthus (*Ailanthus glandulosus*).—The ailanthus is an Asiatic tree which reaches a height of 40 feet and a diameter of 10 inches. It grows extensively along some of the streams, where it propagates freely by means of suckers, and forms dense thickets. The wood is hard, durable, and valuable, but is not used. The growth is rapid.

Staghorn sumach (*Rhus hirta*).—The staghorn sumach is seldom 30 feet in height, growing along streams or in waste places, especially at high elevations. The bark yields a superior tannin for kids, but is not used locally.

Holly (*Ilex opaca*).—The holly is a small evergreen tree, rarely more than 50 feet in height and 12 inches in diameter, and grows chiefly on sandy flats along streams below an elevation of 2,000 feet. The wood is hard, white, and fine grained, and is used to some extent in cabinetmaking. It seeds often and abundantly, and reproduces well. It is much prized as an ornamental tree.

Deciduous holly (*Ilex decidua*).—The deciduous holly is seldom 25 feet in height, with a short trunk and large, spreading crown, growing along streams below an elevation of 1,500 feet. The wood is hard and tough, but is not used.

Mountain holly (*Ilex monticola*).—The mountain holly becomes 25 feet in height and 10 inches in diameter, and is common on cold slopes at high elevations. The wood is not used.

Mountain maple (*Acer spicatum*).—The mountain maple is a small tree, seldom 20 feet in height, often with several stems from the same root, which grows in cold, wet soil at high altitudes. It has no uses.

Striped maple (*Acer pennsylvanicum*).—The striped maple becomes 50 feet in

height and 14 inches in diameter, and is found frequently along cold streams above an elevation of 3,000 feet. The wood is not used.

Sugar maple (*Acer saccharum*).—The sugar maple reaches a height of 120 feet and a diameter of 40 inches. It is common north of the Cowee Mountains, above an elevation of 2,000 feet on cold, moist soil. The hard, fine-grained wood is sawed for flooring; the figured wood for furniture stock. A small quantity of maple sugar is made from the sap. It seeds frequently and abundantly, and young trees are common in damp woods. The rate of growth is slow.

Black maple (*Acer saccharum nigrum*).—The black maple is a tree similar in size to the sugar maple, but much less common, being largely confined to the western slope of the Smoky Mountains.

Red maple (*Acer rubrum*).—The red maple becomes 110 feet in height and 36 inches in diameter, and is common on moist soil, and the young growth in culled woods. The wood is softer and inferior to that of the black maple. The species seeds freely and reproduces well. The rate of growth is slow.

Drummond maple (*Acer rubrum drummondii*).—The Drummond maple is a smaller tree than the red maple, being seldom more than 80 feet in height and 24 inches in diameter. It is common along the banks of the larger streams. The wood is soft and white, and is not used. The species seeds freely and young trees are common.

Boxelder (*Acer negundo*).—The boxelder becomes 40 feet in height and 12 inches in diameter, and is frequent along the large streams at a low elevation. The wood is not used.

Buckeye (*Æsculus octandra*).—The buckeye becomes a tree 120 feet in height and 48 inches in diameter. It is common in cold hollows, especially above an elevation of 3,000 feet. The wood is light and soft, but is not generally used. The species reproduces freely. The rate of growth is good.

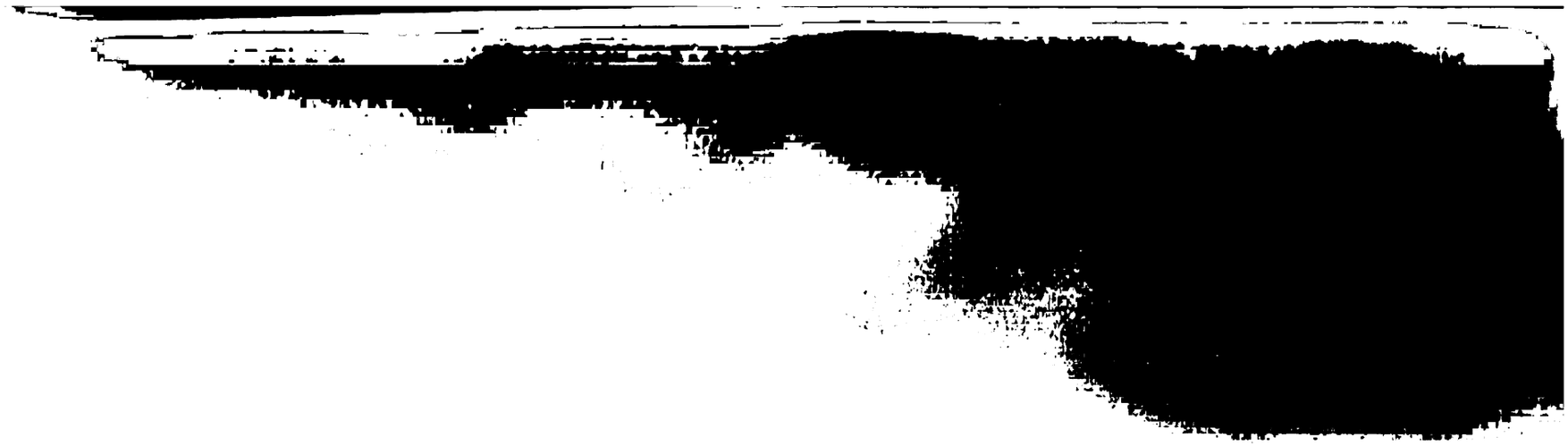
Purple buckeye (*Æsculus octandra hybrida*).—The purple buckeye is a smaller and less common tree than the last-described species, and is confined to the western slope of the Smoky Mountains. The wood is similar to that of the preceding.

Buckthorn (*Rhamnus caroliniana*).—The buckthorn is seldom more than 25 feet in height. It is found on open slopes near the larger streams. The wood is not used.

Linn (*Tilia heterophylla*).—The linn becomes 120 feet in height and 48 inches in diameter, and is common along streams and in cool hollows. The wood is white, light, and soft, and is extensively sawed for lumber. The tree seeds freely, but seedlings are not common. It sprouts freely from the stump.

Blue Ridge linn (*Tilia eburnea*).—This tree is similar to the species last

CASCADES NEAR HEAD OF CATAWBA RIVER, NORTH CAROLINA.



described in size and quality of wood. It is confined to the Blue Ridge, or the region near there.

Basswood (*Tilia americana*).—The basswood reaches a height of more than 100 feet and a diameter of 36 inches. It is confined to streams at the base of the western slope of the Smoky Mountains, but is by no means common. The wood is used with that of the linn without distinction.

Dogwood (*Cornus florida*).—The dogwood forms a small tree, seldom 30 feet in height and 12 inches in diameter. It is common beneath the shade of other trees on fertile soil, below an elevation of 3,000 feet. The wood is hard, heavy, and strong, and is used for shuttle blocks and a variety of mechanical purposes. The species seeds abundantly and reproduces freely. The rate of growth is slow.

Blue cornel (*Cornus alternifolia*).—This is a slender tree 25 feet in height. It is common along cold mountain streams.

Swamp cornel (*Cornus sericea*).—This is a bushy tree 20 feet in height. It is common along the larger streams.

Black gum (*Nyssa sylvatica*).—The black gum sometimes reaches 110 feet in height and 36 inches in diameter, but is generally much smaller. It is common along streams at low elevations and on dry slopes at high elevations. The wood is hard and tough, but not durable, and is little used except as rails for tramways in logging. The species seeds abundantly and reproduces freely. It grows rapidly.

Sourwood (*Oxydendrum arboreum*).—The sourwood forms a tree 80 feet in height and 18 inches in diameter. It is common on dry soil below an elevation of 4,000 feet. The red wood is hard and fine grained, and takes a good polish. It is used to some extent in the manufacture of furniture. It seeds abundantly and reproduction is prolific. The rate of growth is fair.

Persimmon (*Diospyros virginiana*).—The persimmon reaches 40 feet in height and 18 inches in diameter. It is found in fields and waste places. The hard, tough wood is used for shuttle blocks, shoe lasts, insulator pins, etc. The species seeds freely and reproduces well, especially on old fields.

Sweetleaf (*Symplocos tinctoria*).—The sweetleaf is a small tree, seldom more than 20 feet in height, which grows on dry soil. The bark yields a yellow dye.

Peawood or bell-tree (*Mohrodendron carolinum*).—This species is common along streams, where it is seldom 70 feet in height, but in the rich, damp hollows of the Black and Smoky mountains it becomes 100 feet in height and 30 inches in diameter. The reddish wood is hard, fine grained, and takes a good polish, and on the western slopes of the Smoky Mountains is sawed and sold as cherry. The species seeds frequently and freely, and reproduces well. The rate of growth is fair.

Black ash (*Fraxinus nigra*).—The black ash is not more than 30 feet in

Species which only under the most favorable conditions assume arborescent form—Continued.

Dwarf cherry (Prunus cuneata).
Chokecherry (Prunus virginiana).
Mountain stuartia (Stuartia pentagyna).
St. Andrew's cross (Ascyrum hypericoides).
Shrubby St. John's-wort (Hypericum prolificum).
Bushy St. John's-wort (Hypericum densiflorum).
Doubtful St. John's-wort (Hypericum ambiguum).
Riverside St. John's-wort (Hypericum nudiflorum).
Buckley St. John's-wort (Hypericum buckleyi).
Table-rock hudsonia (Hudsonia montana).
Leatherwood (Dirca palustris).
Spikenard (Aralia spinosa.)
Pepperbush (Clethra acuminata).
Early azalea (Azalea nudiflora).
Downy azalea (Azalea canescens).
Yellow azalea (Azalea lutea).
Fragrant azalea (Azalea arborescens).
White azalea (Azalea viscosa).
Vasey azalea (Azalea vaseyi).
Winterberry (Gaultheria procumbens).
Mountain laurel (Rhododendron maximum).
Purple laurel (Rhododendron catawbiense).
Small laurel (Rhododendron punctatum).
Menziesia (Menziesia pilosa).
Leather-leaf (Chamædaphne calyculata).
Mountain myrtle (Dendrium prostratum).
Blue-ridge myrtle (Dendrium hugeri).
Sheep wicky (Kalmia angustifolia).
Kalmia (Kalmia latifolia).
Dog hobble (Leucothoe catesbaei).
Common leucothoe (Leucothoe racemosa).
Buckley leucothoe (Leucothoe recurva).
Fetter-bush (Pieris floribunda).
Stagger-bush (Xolisma ligustrina).
Tangle berry (Gaylussacia frondosa).
Northern high-bush huckleberry (Gaylussacia resinosa).
Dwarf huckleberry (Gaylussacia dumosa).
Buckberry (Gaylussacia ursina).
Box huckleberry (Gaylussacia brachycera).
High-bush huckleberry (Vaccinium virgatum).
Common blueberry (Vaccinium corymbosum).
Mountain huckleberry (Vaccinium pallidum).
Dwarf blueberry (Vaccinium vaccilans).
Black huckleberry (Vaccinium atrocum).
Pale deerberry (Vaccinium glaucum).
Deerberry (Vaccinium stamineum).
Sparkleberry (Vaccinium arboreum).
Hairy huckleberry (Vaccinium hirsutum).
Cranberry (Oxycoccus macrocarpus).
Bearberry (Oxycoccus erythrocarpus).
Styrax (Styrax americana).
Common elder (Sambucus canadensis).
Red-berried elder (Sambucus pubens).
Pubescent arrowwood (Viburnum alnifolium).
Arrowwood (Viburnum acerifolium).
Swamp arrowwood (Viburnum molle).
Hobble-bush (Viburnum lentago).
Swamp haw (Viburnum cassinoides).
Swamp haw (Viburnum nudum).
Black haw (Viburnum rufotomentosum).
Coral-berry (Symphoricarpos symphoricarpos).
Yellow honeysuckle (Lonicera flava).
Mountain honeysuckle (Lonicera glaucescens).
Woodbine (Lonicera sempervirens).

RATE OF GROWTH.

White pine.—White pine is the most rapid-growing tree of the Southern Appalachians. The most rapid growth and best development are attained on sandy or gravelly soils on north and northwest slopes, between elevations of 2,500 and 4,000 feet. The table below shows the rate of diameter increase by decades at three different places. At Higgins Creek the elevation is the greatest and the growth slowest. The best growth is made on Linville and New rivers, in Watauga County, N. C., at elevations between 3,000 and 4,000 feet.

Along the eastern slope of the Blue Ridge, between 1,500 and 2,000 feet, the rate of growth is somewhat slower than on the plateau.

Rate of diameter growth of white pine by decades.

Locality.	Conditions.	Diameter, in inches, on stump, inside of bark, at 10-year intervals.							
		10	20	30	40	50	60	70	80
Higgins Creek, Unicoi County, Tenn., 7 trees in group.	Sandy soil; northeast aspect; elevation, 4,300 feet.	1.8	3.4	5.5	7.6	9.1	10.9	13.3	15.4
Linville River, Watauga County, N. C., 12 trees in group.	Sandy-loam soil; northeast aspect; well sheltered; elevation, 3,900 feet.	2.4	5.4	9.0	11.8	15.16	17.8	19.8	21.4
Table Rock Creek, Burke County, N. C., 18 trees in group.	Gravelly loam; southwestern slope; elevation, 1,500 feet.	2.2	4.6	7.4	10.6	13.6	16.8	18.1	19.6

Many single trees measured in the valleys of Watauga and New rivers show a diameter growth which is about the same as that of the trees on Linville River. In a few cases individual trees much exceeded this average. The trees measured are all forest-grown specimens with well-developed stems and normal in height.

Summary of measurements of growth of white pine.

Locality.	Age of group.	Diameter on stump, inside of bark.	Height.	Length of merchantable timber.	Merchantable timber.	Average increase in diameter of stump for each decade.	Increase in diameter of wood, last ten years.
		Inches.	*Feet.*	*Feet.*	*Feet B. M.*	*Inches.*	*Inches.*
Higgins Creek	117	20.8	84	46	467	1.7	1.1
Linville River	162	29.6	115	73	920	1.8	.8
Table Rock Creek	80	19.6	81	45	328	2.4	2.0

In the Southern Appalachians white pine, under average conditions, becomes a merchantable tree 14 inches in diameter on the stump, outside of bark, when 30 years old; on poor soil it becomes merchantable when about 45 years old; on good soil and at a low elevation even as early as the 25th year. It must be understood that this is not true of all trees, but of a considerable proportion. Two full-stocked areas of young white pine were measured, which show the possibilities of timber production in this region.

Yield of full-stocked areas of white pine under good conditions of growth.

Age.	Number of trees per acre.	Number of trees per acre over 12 inches in diameter.	Height of 12-inch trees.	Merchantable timber in trees over 12 inches in diameter.
			Feet.	*Feet, B. M.*
30 years	218	74	62	6,800
80 years	140	93	98	29,000
150 years	78	75	119	71,000

Shortleaf and white pines often occur together along the Blue Ridge, and in the basin of French Broad River. It is interesting to compare the rate of growth of these trees when growing side by side on the same soil and under similar conditions.

At the end of eighty years the white pine has a diameter on the stump more than one-third greater than that of the shortleaf pine at the same age.

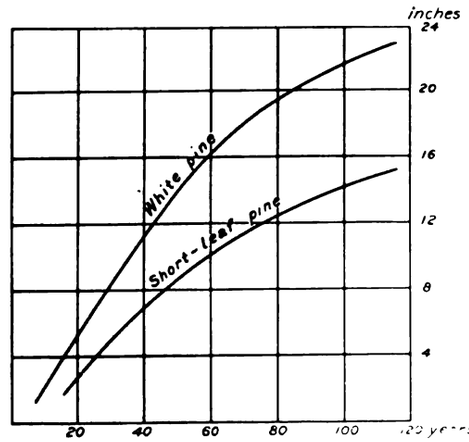


FIG. 1.—Diagram showing the rates of diameter growth of the shortleaf and white pines.

The difference in the height of growth of the two trees is not so great as that of the diameter accretion, but it is yet very marked. White pines 80 years old average 85 feet in height, and are yet growing at the rate of more than 6 inches in height a year, while shortleaf pines 80 years old are less than 70 feet in height. One group of shortleaf pines, 150 years old, averaged only 94 feet in height. White pine has from one and one half to two times as much merchantable timber per tree as shortleaf pines of the same age.

The rate of growth of the shortleaf pine is more rapid, however, on the foothills of the eastern slope of the Blue Ridge, below 1,500 feet elevation, than

elsewhere in the Southern Appalachians. A group of 12 trees, measured on Tuskeegee Creek, Jackson County, N. C., at an elevation of 1,700 feet, had an average age of 104 years, and had reached only 11 inches in diameter, or their diameter growth was less than 1 inch per decade. The average height of this group was only 84 feet. The black pine (northern pitch pine) shows a somewhat greater diameter growth than the shortleaf pine, but its height growth is not so rapid and it is a shorter tree.

The scrub pine never attains a large size, and although its rate of growth is at first more rapid than that of the shortleaf pine, it is at length outgrown. It seldom attains a greater age than 100 years, and most of the old trees seem to be between 80 and 90 years of age.

Average increase in diameter, on stump, of a group of five trees of scrub pine, at 10-year intervals.

	Diameter in inches.
10 years	1.4
20 years	5.2
30 years	7.4
40 years	9.2
50 years	11.0
60 years	12.2
70 years	13.0
80 years	13.4
90 years	14.0

These trees had an average height of 70 feet; the average length of stem was 49 feet; the merchantable timber amounted to 180 feet B. M. per tree. The scrub pine is too small to be of value as a timber tree, but its rapid growth to the sixtieth year along the foothills of the Blue Ridge, and its heavy yield in full-stocked areas, may make it of value as a fuel producer. It is rapidly increasing, especially in the culled woodland along the Blue Ridge.

Hemlock.—Hemlock is one of the slowest growing trees of the Southern Appalachians. Three groups of trees were measured at different elevations in Mitchell County, N. C. All were growing on good soil and under average conditions. These measurements show that hemlock has an average annual accretion of less than 3 feet B. M. per single tree, while white pine under the same conditions gains nearly 5 feet B. M. per tree. There is very little young growth of hemlock, and it is improbable that it will be largely represented in the second-growth woodland.

Condition of hemlock in Mitchell County, N. C.

Situation.	Number of trees in group.	Average diameter of stump inside bark.	Average increase in diameter per decade.	Age of group.	Height of group.
		Inches.	*Inches.*	*Years.*	*Feet.*
Bottom land, 4,000 feet elevation	5	27	1.5	181	96
North slope, 4,500 feet elevation	8	26	1.4	190	96
Bottom land, 3,900 feet elevation	5	27	.8	360	107

White oak.—The rate of growth of the white oak varies widely according to the soil and elevation. A group of six trees growing with white pines on a sandy loam soil, at an elevation of 4,000 feet, in Mitchell County, N. C., show extremely slow growth. Undoubtedly the shade of the white pine has something to do with the very slow growth of these trees, but other species at the same elevation and slightly higher, associated with chestnut and maple, show about the same rate of growth.

Summary of measurements of six white oaks, under poor conditions of growth, Mitchell County, N. C.

[Elevation, 4,000 feet; soil, a sandy loam; aspect, northwest.]

Age	years	214
Diameter of stump, inside bark	inches	17.2
Average increase in diameter of stump for each decade	do	0.8
Increase in diameter for last ten years	do	.5
Height	feet	81
Length of merchantable timber	do	31
Merchantable timber	feet B. M.	178

On alluvial bottoms and in moist hollows, especially those with southern exposure, the growth is more rapid. A group of nine trees was measured on the alluvial lands of Catawba River near Marion, N. C., at an elevation of about 1,300 feet. These trees probably grow more rapidly than the white oak in most situations in the Southern Appalachians, as the soils are exceptionally suited for forest growth, and the elevation is low and the climate warm. However, measurements of single trees on limestone soils in eastern Tennessee seemed to show that the rate of growth of the white oak in such situations is nearly as rapid as on Catawba River.

A. APPALACHIAN MOUNTAIN FIELD COMPLETELY RUINED BY EROSION.

B. DRIFTWOOD LEFT ON FIELDS, THE SOIL BEING WASHED AWAY, NEAR ERWIN, TENN.

Summary of measurements of nine white-oak trees, under good conditions of growth, on Catawba River near Marion, N. C.

Age	years..	141
Diameter of stump, inside bark	inches..	25.8
Average increase in diameter of stump for each decade	do....	1.8
Increase in diameter for last ten years	do....	1.1
Height	feet..	109
Length of merchantable timber	do....	47
Merchantable timber	feet B. M..	847

Scarlet oak.—Scarlet oak grows more rapidly than any other of the Southern Appalachian oaks. A group of six trees was measured on Table Rock Creek, McDowell County, N. C., and the measurements of single trees at other places show these trees may be assumed to represent the average diameter growth of the species in this region except at high elevations or on very poor dry soils.

Summary of measurements of six scarlet-oak trees in McDowell County, N. C.

Age	years..	131
Diameter of stump, inside bark	inches..	24.6
Average increase in diameter of stump for each decade	do....	1.7
Increase in diameter for last ten years	do....	1.3
Height	feet..	83
Length of merchantable timber	do....	29
Merchantable timber	feet B. M..	690

These may be considered fully mature specimens of the scarlet oak, as trees with a diameter of more than 25 inches on the stump inside of the bark are uncommon. Specimens of scarlet oak 20 inches or more in diameter are generally unsound, so that it is probable that decline begins at a much smaller size.

Red oak.—The red oak grows slower than the scarlet oak, but reaches the largest size and maintains its growth longer than any other oak of the region. It is found throughout the area examined and is common from an elevation of 1,500 feet to the summits of the highest mountains. It shows, like the white oak, wide variations in increment under different conditions and at different elevations. Six trees were measured on Yellow Creek, Graham County, N. C., and their rate of growth is probably near the average for the species, under normal conditions, below an elevation of 3,500 feet.

Summary of measurements of six trees of red oak, under good conditions of growth, on Yellow Creek, Graham County, N. C.

Age	years	183
Diameter of stump, inside bark	inches	28
Average increase in diameter of stump for each decade	do	1.5
Increase in diameter for last ten years	do	.9
Height	feet	114
Length of merchantable timber	do	39
Merchantable timber	feet B. M.	971

Seven trees were measured in Watauga County, N. C., at about the same elevation and slope as in Graham County, but on a thinner, sandier soil. This group shows a somewhat slower rate of growth than that in Graham County.

Summary of measurements of seven trees of red oak, under fair conditions of growth, Watauga County, N. C.

Age	years	217
Diameter of stump, inside bark	inches	29
Average increase in diameter of stump for each decade	do	1.3
Increase in diameter for last ten years	do	.8
Height	feet	102
Length of merchantable timber	do	35
Merchantable timber	feet B. M.	955

Chestnut oak.—Chestnut oak is usually found on dry, sunny, or rocky, often sandy, slopes, and in such situations grows very slowly.

The following measurements were made of typical trees growing under average conditions, and show what rate of growth may be expected of the chestnut oak on well-drained southern slopes and along the crests of ridges:

Summary of measurements of seven trees of chestnut oak, growing under average conditions on the crest of the Blue Ridge, Burke County, N. C.

[Altitude, 1,900 feet.]

Age	years	77
Diameter of stump, inside bark	inches	23
Average increase in diameter of stump for each decade	do	.2
Increase in diameter for last ten years	do	.4
Height	feet	63
Length of merchantable timber	do	31
Merchantable timber	feet B. M.	560

The species grows much more rapidly, however, on better and moister soil, as is shown by the following measurements of ten trees growing on a north slope at the head of a hollow under exceptionally good conditions for this species:

Summary of measurements of ten trees of chestnut oak on Noland Creek, Swain County, N. C.

[Soil, good; elevation, 3,200 feet.]

Age	years..	221
Diameter of stump, inside bark	inches..	30.4
Average increase in diameter of stump for each decade	do...	1.4
Increase in diameter for last ten years	do...	0.6
Height	feet..	95
Length of merchantable timber	do...	43
Merchantable timber	feet B. M..	885

Chestnut.—Chestnut grows very rapidly when young, especially in height, but after it is 50 or 60 years old the height growth greatly decreases and ceases almost altogether after it is one hundred years old. The diameter growth is more sustained, and is especially rapid at the lower part of the stem, so that the trunks taper very much or are swollen at the butt. Chestnuts will yield very much less timber than poplars of the same stump diameter on account of their shorter stems and the greater amount of taper.

Summary of measurements of a group of six chestnuts on south slope, Linville River, North Carolina.

[Soil, poor; elevation, 400 feet.]

Age	years..	205
Diameter of stump, inside bark	inches..	29
Average increase in diameter of stump for each decade	do...	1.3
Increase in diameter for last ten years	do...	0.6
Height	feet..	86
Length of merchantable timber	do...	28
Diameter, at top of merchantable timber, inside bark	inches..	22
Merchantable timber	feet B. M..	620

Summary of measurements of a group of nine chestnuts in a sheltered hollow on Noland Creek, Swain County, N. C.

[Soil, good; aspect, southerly; elevation, 2,500 feet.]

Age	years..	202
Diameter of stump, inside bark	inches..	41
Average increase in diameter of stump for each decade	do...	2
Increase in diameter for last ten years	do...	1.1
Height	feet..	108
Length of merchantable timber	do...	62
Diameter, at top of merchantable timber, inside bark	inches..	21
Merchantable timber	feet B. M..	2,200

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Classification of lands in area examined.

Area.	Total area examined.	Cleared.		Wooded.		Severely burned, yet woodland.[a]	
	Acres.	Acres.	Per cent.	Acres.	Per cent.	Acres.	Per cent.
New River basin	711,872	328,960	46.0	382,912	54.0	16,013	2.3
Holston, southern tributaries of South Fork	233,280	53,920	23.0	179,680	77.0	8,083	3.4
Watauga River basin	440,992	151,200	34.0	294,592	66.0	7,936	1.8
Nolichucky River basin	569,920	135,520	24.0	434,400	76.0	2,560	.4
French Broad River basin (north of Skyland)	555,840	270,720	49.0	285,120	51.0		
Big Pigeon River basin	345,440	71,040	21.0	274,400	79.0	5,600	1.5
Smoky Mountains, northwestern slope	254,720	21,120	8.0	233,600	92.0	4,320	2.0
Little Tennessee River basin	1,018,054	91,629	9.0	926,425	91.0	640	.05
Hiwassee River basin	223,456	43,424	29.0	180,032	71.0		
Tallulah and Chattooga River basins	348,588	37,452	11.0	311,136	89.0		
Toxaway River basin	52,243	2,560	5.0	49,683	95.0		
Saluda River basin	30,796	1,920	6.0	28,876	94.0		
First and Second Broad River basins	54,400	10,880	20.0	43,520	80.0		
Catawba River basin	321,440	57,280	18.0	264,160	82.0	23,520	7.0
Yadkin River basin	253,120	40,800	16.0	212,320	84.0	9,401	4.0
Total	5,414,161	1,318,425	24.0	4,100,856	76.0	78,073	.014

[a] Included under Wooded.

Amount of log timber and small wood in area examined.

Areas.	Log timber.		Small wood.	
	Total stand.	Average stand per acre.	Total stand.	Average stand per acre.
	M feet B. M	*M feet B. M*	*Cords.*	*Cords.*
New River basin	794,447	2.07	6,251,080	16.32
Holston River basin (South Fork)	462,170	2.53	2,793,080	15.25
Watauga River basin	841,556	2.93	[illegible]	17.50
Nolichucky River basin	1,553,340	3.58	[illegible]	16.58
French Broad River basin (Skyland to Tennessee line)	665,360	[illegible]	4,816,240	15.14
Big Pigeon River basin	861,721	[illegible]	6,499,880	23.69

The more rapid height growth of the chestnut in large measure accounts for the scant reproduction of the yellow poplar in culled woods, for poplar and chestnut both freely seed such openings, the young poplars often outnumbering

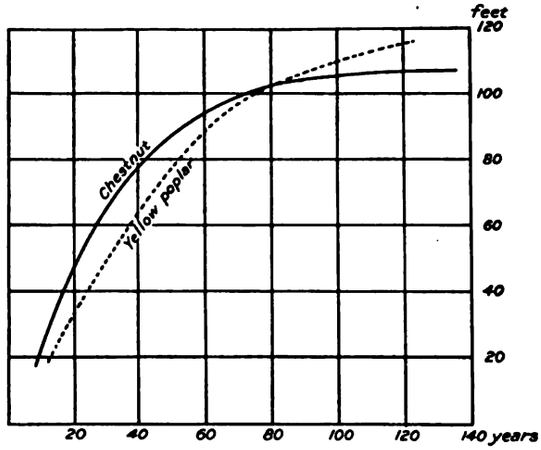


FIG. 2.—Curves showing the rates of height growth of yellow poplar and chestnut on good soil.

the chestnuts, but the chestnut grows far more rapidly, overtops the poplar, and suppresses it.

DESCRIPTION OF DRAINAGE BASINS.

In order to present in more convenient form detailed information concerning forest conditions in the Southern Appalachians the following descriptions have been arranged by drainage basins, beginning at the northeast and moving around the mountains to the place of beginning. This arrangement will serve an important purpose in the consideration of water flow and also in that of transportation. The region has, for this purpose, been divided into the following fourteen drainage areas:

New River basin.
South Fork of Holston River basin (southern tributaries only).
Watauga River basin.
Nolichucky River basin.
French Broad River basin.
Big Pigeon River basin.
Northwestern slope of Smoky Mountains.
Little Tennessee River basin.
Hiwassee River basin.
Tallulah and Chattooga River basins.
Toxaway River basin.
Saluda River and First and Second Broad River basins.
Catawba River basin.
Yadkin River basin.

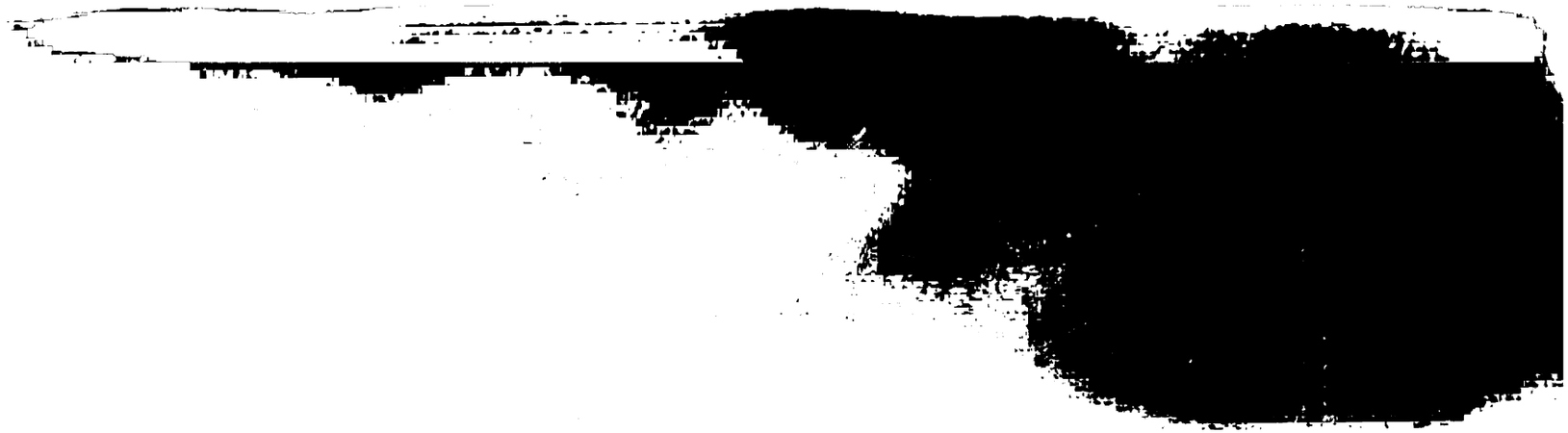
Approximate percentages of the principal timber trees—Continued,

Area.	Cherry.	Cucumber.	Peawood.	Buckeye.	Linn.	Black gum.	Beech.
New River basin	.....	.....	.....	2.00	3.00	1.00	1.00
Holston River basin (South Fork)	.....	.....	.....	1.00	2.00	2.00	1.00
Watauga River basin	.....	1.00	.....	2.00	3.00	1.00	2.00
Nolichucky River basin	.....	1.00	.....	2.00	3.00	1.00	1.00
French Broad River basin	.....	1.00	.....	1.00	2.00	4.00	1.00
Big Pigeon River basin	1.00	3.00	.....	4.00	4.00	1.00	2.00
Smoky Mountains, northwestern slope	1.00	2.00	1.00	6.00	5.00	2.00	2.00
Little Tennessee River basin	.....	1.00	.....	2.00	3.00	1.00	1.00
Hiwassee River basin	.....	.....	.....	.....	1.00	2.00	1.00
Tallulah and Chattooga River basins	.....	.....	.....	.....	.....	3.00	.....
Toxaway River basin	.....	.....	.....	.....	.....	3.00	.....
Saluda River basin	.....	.....	.....	.....	.....	3.00	.....
First and Second Broad River basins	.....	.....	.....	.....	1.00	3.00	.....
Catawba River basin	.....	.....	.....	.....	1.00	3.00	.....
Yadkin River basin	.....	.....	.....	.....	1.00	2.00	.....
Entire area	0.17	0.84	0.09	2.00	2.69	1.64	1.06

Area.	Birch.	Maple.	Hickory.	Locust.	Black pine.	Shortleaf pine.	Other species less than 1 per cent each
New River basin	3.00	3.00	1.00	1.00	1.00	.....	8.00
Holston River basin (South Fork)	2.00	4.00	3.00	.....	2.00	1.00	10.00
Watauga River basin	3.00	4.00	2.00	1.00	1.00	.....	7.00
Nolichucky River basin	3.00	3.00	2.00	1.00	1.00	.....	8.00
French Broad River basin	3.00	4.00	3.00	1.00	1.00	1.00	6.00
Big Pigeon River basin	5.00	4.00	2.00	1.00	1.00	.....	10.00
Smoky Mountains, northwestern slope	7.00	5.00	1.00	1.00	1.00	.....	13.00
Little Tennessee River basin	3.00	2.00	4.00	.....	1.00	.....	10.00
Hiwassee River basin	.....	1.00	5.00	.....	1.00	1.00	11.00
Tallulah and Chattooga River basins	1.00	.....	7.00	1.00	3.00	2.00	8.00
Toxaway River basin	1.00	.....	7.00	.....	3.00	2.00	8.00
Saluda River basin	1.00	.....	8.00	....	3.00	2.00	8.00
First and Second Broad River basins	1.00	.....	8.00	.....	3.00	3.00	8.00
Catawba River basin	1.00	.....	5.00	1.00	3.00	3.00	8.00
Yadkin River basin	1.00	1.00	5.00	1.00	2.00	1.00	8.00
Entire area	3.03	2.67	3.16	0.67	1.84	0.48	9.40

A. SOIL REMOVED AND WHITE SAND SPREAD OVER SURFACE, CATAWBA RIVER LOWLANDS

B. SAND SPREAD OVER FERTILE SOIL, CATAWBA RIVER LOWLANDS.



Amounts of log timber of principal species.

Area.	Oak.	Chestnut.	White pine.	Hemlock.	Spruce.	Poplar.	Ash.	Cherry.
	M feet B. M.	*M feet B. M.*	*M ft. B. M.*	*M ft. B. M.*	*M ft. B. M.*	*M ft. B. M.*	*M ft. B. M.*	*M ft. B. M.*
New River basin	357,502	158,889	15,889	31,778	7,944	15,889	15,889	.....
Holston River basin (South Fork)	184,868	46,220	55,461	32,344	4,622	4,621	4,621	.....
Watauga River basin	336,622	168,311	42,077	42,077	8,416	8,416	8,416	.....
Nolichucky River basin	621,336	357,268	46,600	77,667	15,533	15,533	15,533	.....
French Broad River basin (below Skyland)	299,412	133,072	13,307	26,614	.....	.....	6,654	.....
Big Pigeon River basin	258,516	129,258	17,234	60,320	8,617	34,469	25,852	8,617
Smoky Mountains, northwestern slope	185,232	111,139	27,785	92,616	18,523	37,046	18,523	9,262
Little Tennessee River basin	1,030,968	515,484	25,774	128,871	25,774	77,323	51,548	.....
Hiwassee River basin	157,771	51,634	2,869	.....	.....	.....	.....	.....
Tallulah and Chattooga River basins	277,778	50,505	10,101	25,253	.....	.....	.....	.....
Toxaway River basin	35,798	6,509	1,953	4,556	.....	.....	651	.....
Saluda River basin	27,989	3,732	467	466	.....	.....	.....	.....
First and Second Broad River basins	17,136	1,999	.....	286	.....	.....	.....	.....
Catawba River basin	368,867	67,069	33,533	33,533	.....	6,707	6,707	.....
Yadkin River basin	323,952	64,790	10,798	16,198	.....	.....	.....	.....
Total	4,483,747	1,865,879	303,848	572,579	89,429	200,004	154,394	17,879
Per cent	41.41	17.20	2.68	5.30	0.80	1.85	1.43	0.17

Area.	Cucumber.	Peawood.	Buckeye.	Linn.	Black gum.	Beech.	Birch.
	M feet B. M.	*M ft. B. M.*	*M feet B. M.*	*M feet B. M.*	*M feet B. M.*	*M feet B. M.*	*M feet B. M.*
New River basin	.....	.....	15,889	23,833	7,944	7,944	23,833
Holston River basin (South Fork)	.....	.....	4,623	9,244	9,243	4,622	9,244
Watauga River basin	8,416	.....	16,831	25,247	8,416	16,831	25,247
Nolichucky River basin	15,533	.....	31,067	46,600	15,533	15,533	46,600
French Broad River basin (below Skyland)	6,654	.....	6,654	13,307	26,614	6,654	19,961
Big Pigeon River basin	25,852	.....	34,469	34,469	8,617	17,234	43,086
Smoky Mountains, northwestern slope	18,523	9,262	55,570	46,308	18,523	18,523	64,831
Little Tennessee River basin	25,774	.....	51,548	77,323	25,774	25,774	77,323
Hiwassee River basin	.....	.....	.....	2,868	5,737	2,869	.....

Amounts of log timber of principal species—Continued.

Area.	Cucumber.	Peawood.	Buckeye.	Linn.	Black gum.	Beech.	Birch.
	M feet B. M.	*M feet B. M.*	*M feet B. M.*	*M feet B. M.*	*M feet B. M.*	*M feet B. M.*	*M feet B. M.*
Tallulah and Chattooga River basins	.....	.....	.....	.....	15,152	.....	5,050
Toxaway River basin	.....	.....	.....	.....	1,953	.....	651
Saluda River basin	.....	.....	.....	.....	1,399	.....	466
First and Second Broad River basins	.....	.....	.....	286	857	.....	286
Catawba River basin	.....	.....	.....	6,707	20,120	.....	6,707
Yadkin River basin	.....	.....	.....	5,399	10,799	.....	5,399
Total	100,752	9,262	216,651	291,591	176,681	115,984	328,684
Per cent	0.84	0.09	2.00	2.69	1.64	1.06	3.03

Area.	Maple.	Hickory.	Locust.	Black pine.	Shortleaf pine.	Other species.	Total.
	M feet B. M.	*M feet B. M.*	*M ft. B. M.*	*M feet B. M.*	*M feet B. M.*	*M feet B. M.*	*M feet B. M.*
New River basin	23,833	7,944	7,944	7,944	.....	63,556	794,447
Holston River basin (South Fork)	18,487	13,865	.....	9,243	4,622	46,224	462,170
Watauga River basin	33,663	16,831	8,416	8,416	.....	58,908	841,556
Nolichucky River basin	46,600	31,067	15,533	15,533	.....	124,237	1,553,340
French Broad River basin (below Skyland)	26,614	19,961	6,654	6,654	6,654	59,922	665,360
Big Pigeon River basin	34,469	17,234	8,617	8,617	.....	86,172	861,721
Smoky Mountains, northwestern slope	46,308	9,261	9,262	9,262	.....	120,401	926,160
Little Tennessee River basin	51,548	103,097	.....	25,774	.....	255,742	2,577,419
Hiwassee River basin	2,869	14,343	.....	2,869	2,868	40,160	286,856
Tallulah and Chattooga River basins	.....	35,353	5,050	15,151	10,101	56,010	505,050
Toxaway River basin	.....	4,556	.....	1,953	1,302	5,207	65,088
Saluda River basin	.....	3,732	.....	1,399	933	6,064	46,648
First and Second Broad River basins	.....	2,285	.....	2,285	857	2,276	[illegible]
Catawba River basin	.....	33,533	6,707	13,413	13,413	53,653	[illegible]
Yadkin River basin	5,399	26,995	5,399	16,198	5,399	43,195	[illegible]
Total	289,790	340,047	73,582	144,711	46,149	[illegible]	[illegible]
Per cent	2.67	3.16	0.67	1.34	0.1[illegible]	[illegible]	[illegible]

NEW RIVER BASIN.

Topography.—New River is tributary to the Ohio through the Kanawha, and drains the eastern portion of the Appalachian Plateau lying between the Blue Ridge on the southeast and Iron Mountain on the northwest. The sources of the tributaries are at elevations of from 3,000 to 5,000 feet, but below the junction of the North and South forks the river valley has an altitude of only 2,000 to 2,500 feet. The topographic features are deep, narrow valleys and ravines, with irregular intervening hills and mountains, among which are a few isolated peaks having an altitude of 5,000 feet and upward, and occasional narrow flats along the larger streams. Many of the old hill fields have been exhausted by close pasturing and the soil is being rapidly removed by erosion.

The basin has an area of 711,872 acres, of which 54 per cent is wooded.

Agriculture.—The greater portion of this area has been cleared, although most of it is too steep to be arable. The hills are cleared for grazing, to which they are better adapted than to agriculture, in view of the great erosion and the difficulty of maintaining roads. Excellent crops of hay and grass are the rule on new land, and the custom is to utilize a clearing until it is exhausted and then clear a new field.

The forest.—The forests of large area are limited to the higher altitudes on the isolated peaks between the North and South forks, and on Balsam and Iron mountains, which form the northwestern rim of the highlands. On the southeastern slope of Balsam Mountain is an almost unbroken forest, approximately 5 miles square, but the long, narrow strip of woodland on Iron Mountain is considerably broken by clearings and burns, while the portions of Pond Mountain and White Top draining into New River have on them only remnants of the old forest.

The forest contains 794,447 M feet B. M. of log timber and 6,251,686 cords of small wood. The proportions of the various species composing the forest are as follows:

Proportions of species in New River basin.

	Per cent.
Oaks	45
Chestnut	20
White pine	2
Hemlock	4
Spruce	1
Poplar	2
Ash	2
Buckeye	2
Linn	3
Black gum	1

Proportion of species in New River basin—Continued.

	Per cent.
Beech	1
Birch	3
Maple	3
Hickory	1
Locust	1
Black pine	1
Other species	8

All the forest is inferior in condition, being either culled, fire scarred, or full of old and defective trees, while a dense undergrowth usually covers the steep slopes.

The condition of these forests would improve readily under scientific management, as valuable species are abundant, reproduce easily, and grow rapidly wherever they have an opportunity. The outlying isolated wood lots, surrounded by cleared land and held by thoughtful farmers, are noticeably in better condition than the larger wild areas in the mountains.

BIG LAUREL CREEK DISTRICT (ASHE COUNTY, N. C.).

Boundaries.—The divides inclosing the portion of Big Laurel Creek basin north of a line drawn eastward from Payn Gap.

Area.—Total, 14.75 square miles; cleared, 5.25 square miles; wooded, 9.50 square miles.

Surface.—Hilly to mountainous.

Soil.—In the coves, dark, fertile loam; on the ridges, lighter but good grazing land.

Agricultural value.—This land produces very good crops of corn and other grains when newly cleared, but owing to the steepness of the slopes is best adapted to grazing, except for about 11 square miles, which are best suited to timber.

Timber trees.—Poplar, 3 per cent; oaks, 50 per cent; maple, 5 per cent; hemlock, 3 per cent; linn, 2 per cent; buckeye, 2 per cent; other species, 35 per cent.

Yield.—Log timber, 26,080 M feet B. M.; small wood, 118,400 cords.

Demand.—This valley is so remote and inaccessible that no timber has been taken from it for the general market except some figured wood. A railway up the New River Valley would probably make this timber worth from 50 cents to $3 per thousand feet on the stump.

Accessibility.—At present this tract is nearly 20 miles from railroad, by an almost impassable wagon road. The land is very hilly and brushy, and logging would be very expensive.

Fire.—Fires have done but slight damage, except on the upper slopes and on the spur extending south from Pond Mountain.

Second growth.—Saplings are abundant wherever the forest is thin enough to make room for them.

Undergrowth.—Laurel is abundant, and the hollows are almost impassable without cutting a way through it. On the ridges there is much brush of other species and there are also many seedlings and sprouts of timber trees.

Reproduction.—Free, except where too brushy or where there has been too much fire.

Rate of growth.—Rapid.

Water power.—Limited.

Occupancy.—About 35 families are now living in this basin.

Prices of land.—Cove land now under cultivation brings from $30 to $50 per acre, while mountain land, unimproved, is worth from $2 to $10 per acre, according to soil and timber.

HORSE CREEK BASIN (ASHE COUNTY, N. C.).

Area.—Total, 49.50 square miles; cleared, 23.75 square miles; wooded, 25.75 square miles.

Surface.—Hilly to mountainous.

Soil.—In the lower portion of the valley red loam derived from limestone; on the higher foothills and the mountain side, a more pourous and lighter-colored soil derived from gneiss and schists.

Agricultural value.—Grass is the principal crop, but corn and the small grains do well when the land is newly cleared. About 10 square miles are adapted to diversified farming.

Timber trees.—Oaks, 60 per cent; chestnut, 20 per cent, other species, 20 per cent.

Yield.—Log timber, 50,720 M feet B. M.; small wood, 223,200 cords.

Demand.—Owing to poor roads and the distance from market the only demand is for local use.

Accessibility.—The center of this tract is about 18 miles by a very rough and hilly wagon road from the nearest railroad point, either Damascus or Chilhowie. The land has very steep slopes and there is much laurel brush.

Fire.—Recently there has been very little fire, the woodland being protected by clearings.

Second growth.—In general there is an abundant stand of saplings.

Undergrowth.—Dense laurel thickets line the ravines and cover the moist

ground. The ridges have an abundance of azalea, dogwood, hazel, blackberry, and huckleberry.

Reproduction.—Reproduction would be free if too much brush were not left after cutting.

Rate of growth.—Rapid.

Water power.—Limited. Horse Creek is inconstant and there are no very favorable sites for reservoirs.

Ownership.—Several large tracts of grazing land on Pond Mountain are held by nonresidents. Most of the area is divided into small holdings which are owned by farmers.

Occupancy.—About 200 families are now living on this tract.

Prices of land.—From $10 to $50 per acre.

HELTON CREEK DISTRICT (GRAYSON COUNTY, VA.).

Boundaries.—The divides inclosing the portion of the drainage of Helton Creek mapped on the Abingdon and Wytheville topographic sheets.

Area.—Total, 39.50 square miles; cleared, 19.25 square miles; wooded, 20.25 square miles.

Surface.—Hilly to mountainous.

Soil.—Loam; fertile in the valleys, but medium on the hills.

Agricultural value.—Grass does well everywhere on newly cleared ground; corn is a fair crop, but the hills are rapidly eroded where corn is planted. The alluvial bottoms of the lower portions of the creek are very productive.

Timber trees.—Oaks, 60 per cent; chestnut, 20 per cent; other species, 20 per cent.

Yield.—Log timber, 38,611 M feet B. M.; small wood, 257,060 cords.

Demand.—Local only, at $1 per thousand feet on the stump.

Accessibility.—The nearest railway points, Chilhowie and Damascus, are 25 to 30 miles distant by a rough and hilly road. The timber in this valley will not find a market until railroads are built much nearer.

Fire.—Only a few of the higher ridges have been seriously burned; the numerous clearings are a great protection against fire.

Second growth.—Deficient; due to too much grazing, yet there are some very good stands.

Undergrowth.—Along streams are dense laurel patches; but the ridges are usually fairly free from underbrush.

Reproduction.—Poor, owing to overgrazing. Seedlings and sprouts spring up quickly after close cutting if cattle are kept out and there are no fires.

Rate of growth.—Rapid.

Water power.—Abundant fall; numerous sites for moderate power, but the stream is inconstant.

Ownership.—Few of the holdings exceed 500 acres, and these are owned almost entirely by residents.

Occupancy.—About 60 families are living in this valley.

Prices of land.—From $5 to $50 per acre.

WILSON CREEK BASIN (GRAYSON COUNTY, VA.)

Area.—Total, 39.75 square miles; cleared, 13.75 square miles; wooded, 26 square miles.

Surface.—Hilly to mountainous.

Soil.—Dark loam with frequent beds of red clay.

Agricultural value.—This is a grazing region. Grass yields well and there is enough arable land for hay. About 10 square miles are adapted to deversified farming.

Timber trees.—Chestnut, 40 per cent; white oak, 10 per cent; red oak, 15 per cent; chestnut oak, 10 per cent; spruce, 2 per cent; birch, 2 per cent; gum, 5 per cent; linn, 5 per cent; other species, 11 per cent.

Yield.—Log timber, 49,520 M feet B. M.; small wood, 332,000 cords.

Demand.—This land is remote from the market and prices are low; $1 per thousand feet is considered a good price for the standing timber. The local demand is limited, as nearly every builder has timber of his own.

Accessibility.—The nearest railroad point is 14 miles distant by a very rough wagon road across two mountain ridges. There is no road to the unbroken forest at the head of the stream. It could best be reached by a tramway up Wilson Creek.

Fire.—On the ridges about the headwaters fires are frequent, but the damage is less notable in this basin than in any other.

Second growth.—Abundant.

Undergrowth.—Brushy, especially on north slopes. Large areas of laurel thickets are found about the head of the stream.

Reproduction.—Free, except as retarded by brush, fire, and grazing.

Rate of growth.—Rapid.

Water power.—There is abundant power for factories of considerable size. One mill is now in operation near the head of the stream.

Ownership.—The foothills are divided among resident farmers.

Occupancy.—About 160 families are now living on this tract.

Prices of land.—From $2 to $40 per acre.

FOX CREEK BASIN (GRAYSON COUNTY, VA.).

Area.—Total, 30 square miles; cleared, 11.75 square miles; wooded, 18.25 square miles.

Surface.—Rolling to mountainous.

Soil.—Red loam, derived from granite, and usually very fertile.

Agricultural value.—Grass, grain, and fruits do very well on the slopes. About 8 square miles of this basin are adapted to diversified farming.

Timber trees.—Chestnut, 25 per cent; white oak, 10 per cent; red oak, 15 per cent; chestnut oak, 10 per cent; hemlock, 8 per cent; spruce, 1 per cent; birch, 2 per cent; linn, 5 per cent; maple, 6 per cent; other species, 18 per cent.

Yield.—Log timber, 39,520 M feet B. M.; small wood, 268,000 cords.

Demand.—The best log timber brings about $1 per thousand feet on the stump.

Accessibility.—The center of this tract is about 10 miles from the railroad, by a rough and hilly wagon road. The wooded land is generally very steep and rocky.

Fire.—Frequent light fires have overrun the ridges, seriously injuring the forest.

Second growth.—Occasional areas have a dense stand of saplings, but in general the second growth is deficient.

Undergrowth.—Except on the ridges there is a dense stand of laurel, azalea, hazel, dogwood, catbriar, and huckleberry.

Reproduction.—On clean cuttings that have not been burned there is a dense stand of seedlings. In some coves that have been intermittently pastured there are many young maples, but in general the amount of brush and the frequency of fire are unfavorable to reproduction.

Rate of growth.—Rapid.

Water power.—Abundant on the lower portion of the stream.

Occupancy.—About 130 families are now living in this basin.

Prices of land.—From $2 to $30 per acre.

GUFFEYS CREEK BASIN (GRAYSON COUNTY, VA.).

Area.—Total, 11.50 square miles; cleared, 4.75 square miles; wooded, 6.75 square miles.

Surface.—Hilly to mountainous.

Soil.—Light, granitic loam.

Agricultural value.—Slight, the land is too steep and liable to wash. It is well adapted to fruit, however, and much of it makes good pasturage. About 2 square miles are adapted to diversified farming.

A. EROSION CHECKED BY COVERING GULLEYS WITH BRUSH, LONGCREEK, VA.

B. EROSION CHECKED BY BRUSH DAMS, WALNUTRUN, N. C.

Timber trees.—Oaks, 60 per cent; chestnut, 20 per cent; hemlock, 5 per cent; white pine, 2 per cent; other species, 13 per cent.

Yield.—Log timber, 13,280 M feet B. M.; small wood, 78,400 cords.

Demand.—The best log timber does not bring over $1 per thousand feet on the stump.

Accessibility.—The center of the tract is about 14 miles from the railroad, by a very rough and hilly wagon road.

Fire.—Fires have been frequent on the ridges and south slopes, seriously injuring the forest.

Second growth.—Saplings are abundant over a large area. Except on the ridges there is usually a sufficient stand for a new forest.

Undergrowth.—There is a moderate amount of brush, and the hollows are lined as usual with laurel and the ridges with sprouts and seedlings.

Rate of growth.—Rapid.

Water power.—Only enough for small grist and saw mills.

Occupancy.—About 60 families are now living in this basin.

Prices of land.—From $1 to $20 per acre.

MIDDLE FOX CREEK BASIN (GRAYSON COUNTY, VA.).

Area.—Total, 11 square miles; cleared, 5.50 square miles; wooded, 5.50 square miles.

Surface.—Hilly to mountainous.

Soil.—Red loam derived from gneiss and schists.

Agricultural value.—Grass, grain, and fruits do well except where the slopes are too steep. About 3 square miles are adapted to farming.

Timber trees.—White oak, 15 per cent; red oak, 10 per cent; black oak, 10 per cent; hemlock, 5 per cent; chestnut, 20 per cent; chestnut oak, 10 per cent; other species, 30 per cent.

Yield.—Log timber, 8,640 M feet B. M.; small wood, 83,200 cords.

Demand.—Only the choice timber is of value.

Accessibility.—The center of this basin is 14 miles from the railroad, by a very rough and hilly wagon road. The remaining timber is on steep and rocky slopes.

Fire.—Fires have been frequent on the mountain ridges and southern slopes and the forests have been much injured.

Second growth.—Saplings are abundant only on north slopes and near clearings, where they are somewhat protected from fire.

Undergrowth.—There is much brush, but sprouts and seedlings are few.

Reproduction.—Free, except for fire and brush.

Rate of growth.—Rapid.

Water power.—Limited; the stream is not large, and it is very inconstant.

Ownership.—Nearly all the basin is divided into small holdings and is owned by resident farmers.

Occupancy.—About 65 families are now living in this basin.

Prices of land.—From $2 to $20 per acre.

DELL DISTRICT (GRAYSON COUNTY, VA.).

Boundaries.—On the north, the crest of Iron Mountain; on the east, the eastern boundary of the area mapped on the Wytheville topographic sheet; on the south, New River; on the west, the eastern divide of Knob Fork basin.

Area.—Total, 12 square miles; cleared, 6.50 square miles; wooded, 5.50 square miles.

Surface.—Hilly to mountainous.

Soil.—Loam derived from gneiss and schists.

Agricultural value.—Very little; when first cleared this land was generally fertile, but it has been worked and eroded until now it is hardly worth cultivating.

Timber trees.—Oaks, 50 per cent; chestnut, 25 per cent; other species, 25 per cent.

Yield.—Log timber, 8,640 M feet B. M.; small wood, 65,600 cords.

Demand.—Very little; the best timber brings about $1 per thousand feet on the stump. It is too far from market.

Accessibility.—The nearest railroad point is Ivanhoe, about 15 miles by very poor road from the center of this tract. The new branch of the Norfolk and Western Railway to Oldtown will open a better market. This land is so hilly that logging will be difficult.

Fire.—The forests of this tract are so isolated by clearings that fires are not prevalent except on Iron Mountain.

Second growth.—There are many good stands of saplings, but there are also many woodlands that are closely pastured, and on these the second growth is deficient.

Undergrowth.—Very light.

Reproduction.—Free, except for fire and grazing.

Rate of growth.—Medium.

Water power.—Limited, as the streams are small and inconstant, except on New River, where very large cotton mills are being erected.

Ownership.—Local.

Occupancy.—About 35 families are living in this basin.

Prices of land.—From $5 to $25 per acre.

KNOB FORK DISTRICT (GRAYSON COUNTY, VA.).

Boundaries.—On the north, the summit of Iron Mountain; on the east, the Stevens Creek divide; on the south and west, the Elk Creek divide.

Area.—Total, 18.50 square miles; cleared, 8 square miles; wooded, 10.50 square miles.

Surface.—Rolling to mountainous.

Soil.—Derived from gneiss and schists, the soil is a light-colored loam, clayey in the valley and porous on the ridges.

Agricultural value.—The soil is naturally fertile, but quickly loses its value under corn cultivation, as erosion is rapid. About 2,500 acres are adapted to permanent agriculture.

Timber trees.—Chestnut, 25 per cent; chestnut oak, 15 per cent; white oak, 15 per cent; red oak, 5 per cent; hickory, 5 per cent; scarlet oak, 5 per cent; black oak, 3 per cent; hemlock, 2 per cent; other species, 25 per cent.

Yield.—Log timber, 6,944 M feet B. M.; small wood, 101,920 cords.

Demand.—Only the best of the log timber is marketable, because of the distance from the railroad. One dollar per thousand feet is a common price on the stump.

Accessibility.—A new market is being opened for this timber on the branch of the Norfolk and Western Railway in New River Valley. The haul will be about 10 miles, over a rough and hilly wagon road. The land itself is not especially difficult to log.

Fire.—On the south slope of Iron Mountain slight fires have been frequent—almost annual. Elsewhere the wood lots are protected by clearings.

Second growth.—About half of the forest has a good stand of saplings; on the remainder second growth is deficient because of fire and grazing.

Undergrowth.—Light, especially on the south slope of Iron Mountain where subdued by fire.

Reproduction.—Naturally free.

Water power.—Limited; Knob Fork will furnish only enough for local saw and grist mills.

Ownership.—Divided among resident farmers.

Occupancy.—About 45 families are living on this tract.

Prices of land.—Mountain lands are worth from $1 to $2 per acre; farm lands, from $10 to $30.

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ELK CREEK DISTRICT (GRAYSON COUNTY, VA.).

Boundaries.—On the north, the summit of Iron Mountain; on the east, Briar Patch Mountain; on the south, Point Lookout and Buck mountains, and on the west, Middle Fox Creek divide.

Area.—Total, 64 square miles; cleared, 32.50 square miles; wooded, 31.50 square miles.

Surface.—Rolling to mountainous, with some narrow bottoms along parts of the creek and its tributaries.

Soil.—The soil is derived from gneiss, schist, and limestone, and is quite variable. It is porous on the mountains, and ridges and light on the slopes. Most of the valley soil is a red clayey loam, naturally very fertile, but needing care to keep it in condition.

Agricultural value.—This is one of the most productive valleys in the county. Large amounts of corn and other grains have been grown, and much of the land is excellently adapted for hay and pasture. The hilly portions are rapidly deteriorating by continued cropping and erosion. About 12,000 acres are well suited to permanent agriculture.

Timber trees.—Chestnut, 25 per cent; chestnut oak, 10 per cent; red oak, 6 per cent; white oak, 10 per cent; maple, 8 per cent; gum, 3 per cent; linn, 2 per cent; cucumber, 2 per cent; hemlock, 5 per cent; white pine, 1 per cent; black pine, 1 per cent; other species, 27 per cent.

Yield.—Log timber, 40,000 M feet B. M.; small wood, 362,040 cords.

Demand.—The best of the log timber brings about $1 per thousand feet on the stump.

Accessibility.—This district is remote from the railroad, the central part being about 15 miles by wagon road from Crocketts station on the Norfolk and Western Railway. The mountain side is steep, but offers no especial difficulty to logging.

Fire.—The south slope of Iron Mountain has been much burned by slight and often repeated fires—reduced, in fact, to scrub growth, and yields only about 8 cords of wood per acre. On the remainder of the tract fires have done much less damage, as the wood lots are protected by clearings.

Second growth.—There are a few very good stands of saplings on the wood lots of the valley, but in general saplings are deficient because of fire, grazing, and close culling.

Undergrowth.—Light.

Reproduction.—Naturally free, but usually prevented by fire and grazing.

Rate of growth.—Medium to rapid.

Water power.—The lower portion of Elk Creek would furnish abundant power for large factories. This tract also borders on New River, which has enormous power and very favorable mill sites.

Ownership.—Local.

Occupancy.—About 150 families are living in this district.

Prices of land.—The mountain lands are worth from 50 cents to $1 per acre; the valley land, from $10 to $40.

PEACH BOTTOM CREEK DISTRICT (GRAYSON COUNTY, VA.).

Boundaries.—On the north, the Elk Creek divide; on the east, New River; on the south and west, Buck Mountain and its southeastward spur to New River near the mouth of Peach Bottom Creek.

Area.—Total, 37.75 square miles; cleared, .19 square miles; wooded, 18.75 square miles.

Surface.—Rolling to mountainous, with narrow and interrupted creek bottoms.

Soil.—In general a red clayey loam.

Agricultural value.—All the soil was very productive when first cleared, but is now much depleted by continued cropping and erosion. Many of the hill fields are deeply gullied and can be used only for pasturage. Frequently the scant grass and Japanese clover on 6 acres would hardly support a cow. About one-third, or 4,000 acres, of the cleared land is adapted to permanent agriculture.

Timber trees.—Chestnut, 25 per cent; chestnut oak, 10 per cent; red oak, 6 per cent; white oak, 10 per cent; maple, 8 per cent; gum, 3 per cent; linn, 2 per cent; cucumber, 2 per cent; hemlock, 5 per cent; white pine, 1 per cent; black pine, 1 per cent; other species, 27 per cent.

Yield.—Log timber, 26,400 M feet B. M.; small wood, 91,200 cords.

Demand.—One dollar per thousand feet for white pine on the stump is the best price known. Choice hard woods might bring more, but the haul is long and expensive.

Accessibility.—Soft woods could be floated down New River. Heretofore hard woods were too far from rail to be put on the general market. If the proposed branch of the Norfolk and Western Railway be built up New River, it would make a convenient market for this timber. The haul would then be down grade. The slopes of Point Lookout and Buck Mountain are steep and rocky and difficult to log.

Fire.—The woodlands on Point Lookout and Buck Mountain have been much burned in the general effort to make pasture land. Elsewhere the woodlands are protected by the surrounding clearings, and fires are not common.

Timber trees.—Oaks, 50 per cent; chestnut, 20 per cent; maples, 10 per cent; gum, 3 per cent; white pine, 3 per cent; hemlock, 2 per cent; others 12 per cent.

Yield.—Log timber, 9,120 M feet B. M.; smallwood, 63,840 cords.

Demand.—Local and slight, except for choicest logs of walnut, cherry, etc. Oak, etc., when sold brings about $1 per thousand feet on stump.

Accessibility.—Remote from markets, with bad roads. Surface not especially difficult to log.

Fire.—Fires are rare, being prevented by clearings.

Reproduction.—Free. After cutting, the same species as before quickly reoccupy the land.

Rate of growth.—Rapid.

Water power.—Limited. The streams are small.

Ownership.—Nearly all this land is held by resident farmers.

Occupancy.—Three-fourths of the land is under cultivation by resident farmers.

Prices of land.—From $2 to $50 per acre.

JEFFERSON DISTRICT.

Boundaries.—This tract lies between the Blue Ridge on the south and New River on the north.

Area.—Total, 369.25 square miles; cleared, 201.50 square miles; wooded, 167.75 square miles.

Surface.—Hilly to mountainous.

Humus and litter.—Very little.

Soil.—Derived from gneiss and schist by decomposition and erosion, forming red clay in the valleys and clayey loam on the hills.

Agricultural value.—Generally fertile; wheat, corn, oats, and grass do well on new ground, but the steep slopes are so liable to erosion that hill land soon wears out.

Timber trees.—Oaks, 56 per cent; chestnut, 20 per cent; black gum, 3 per cent; sugar maple, 2 per cent; red maple, 1 per cent; white pine, 3 per cent; hemlock, 3 per cent; black pine, 1 per cent; cucumber, 1 per cent; buckeye, 1 per cent linn, 1 per cent; others, 8 per cent.

Yield.—Log timber, 187,850 M feet B. M.; small wood, 1,819,942 cords.

Demand.—Stumpage prices are practically nominal, owing to the distance from market. Occasionally some of the best log timber is sold at $1 per thousand feet on the stump.

Accessibility.—Owing to the distance from market and the bad roads, the cost of transportation is usually more than the timber is worth.

Fire.—The woodland is so much broken by clearings that fires are not prevalent.

Second growth.—Variable, according to the treatment the tract has received. On land little culled the stand of saplings is very deficient, while on the clean cuttings about Ore Knob the land is fully occupied by a dense stand of the same species that occupied the land before the cutting.

Undergrowth.—Laurel and rhododendron are abundant on north slopes, but elsewhere the undergrowth is light, except where the forest has been severely culled; then sprouts, seedlings, and brush become abundant.

Reproduction.—Reproduction is free except where the land has been closely pastured; even on some of the old pastures pine is coming in abundantly.

Rate of growth.—Rapid, except on the poorest ridges and knolls.

Water power.—New River has abundant water powers and may be controlled without great difficulty. The tributaries passing through this tract have only sufficient water for small gristmills and sawmills.

Ownership.—There are few large holdings; nearly all the tract is subdivided into farms of less than 1,000 acres each.

Occupancy.—This is a farming region and is occupied by over 500 families.

Prices of land.—The bottom lands are valued at $30 to $60 per acre, but the rough and hilly lands could be bought for $2 per acre.

BOONE DISTRICT (WATAUGA COUNTY, N. C.).

Boundaries.—On the north and east, the borders of the area shown on Cranberry topographic sheet; on the south, the crest of the Blue Ridge; on the west, the divide between Watauga and New rivers.

Area.—Total, 243.80 square miles; cleared, 101.50 square miles; wooded, 142.30 square miles.

Surface.—Except about 1 per cent of alluvial lands, the surface is hilly to mountainous, varying between elevations of 3,000 feet along the North and South forks of New River to 5,555 feet on Elk Knob, the highest of 11 prominent mountain peaks within this district. The region is deeply cut into sharp ridges and valleys by the numerous creeks.

Soil.—Generally fertile. In the valleys the soil is a red clay loam, very fertile when first cleared, but soon compacting and eroding. On the mountains it is more porous and durable.

Agricultural value.—A large proportion of the cleared lands, perhaps 50 per cent, can not be profitably cultivated, but are pastured and are rapidly eroding.

Timber trees.—White oak, 18 per cent; red oak, 5 per cent; black oak, 3 per cent; scarlet oak, 5 per cent; chestnut oak, 6 per cent; chestnut, 22 per cent; cucumber, 2 per cent; linn, 3 per cent; ash, 1 per cent; maple, 4 per cent; buckeye, 3 per cent; hemlock, 7 per cent; white pine, 2 per cent; other species, 19 per cent.

Yield.—Log timber, 217,154 M feet B. M.; small wood, 1,432,724 cords.

Demand.—The best of the figured woods, cherry and walnut, are hauled to the railroad; but for other lumber there is only a local demand at about $1 per thousand feet on the stump.

Accessibility.—Wilkesboro is about 25 miles southeast of this tract, while the Virginia and Southwestern Railway is 6 miles northwest. The wagon roads are very rough and hilly, and the fords are often impassable. A railroad is projected up the Watauga Valley, and another up the valley of the North Fork of New River.

Fire.—Fires are less prevalent here than in most of the mountain region, being checked by numerous clearings. About Three Top and Snake mountains and along the Blue Ridge there have been several severe fires.

Second growth.—Saplings are abundant except on the burns of the ridges and mountains.

Undergrowth.—Laurel, rhododendron, azalea, dog hobble, dogwood, and other shrubs are abundant.

Reproduction.—Seedlings and sprouts of the valuable species spring up quickly after cutting. White pine, chestnut, and the oaks are very promising for second growth.

Rate of growth.—Rapid.

Water power.—Abundant on all the larger streams.

Occupancy.—About 900 families are living on this tract.

Prices of land.—The mountain lands are valued at about $2 per acre; the best farm lands, at $30 to $50. Much of the hilly farm land could be bought for $10 per acre.

BEVERLY DISTRICT (WYTHE COUNTY, VA.).

Boundaries.—On the north, Cripple Creek; on the east, the eastern border of the area shown on the Wytheville topographic sheet; on the south, the crest of Iron Mountain; on the west, the western divide of Francis Mill Creek.

Area.—Total, 31.75 square miles; cleared, 5 square miles; wooded, 26.75 square miles.

Surface.—Hilly to mountainous, with narrow strips of bottom land along Cripple Creek and the lower portions of the tributaries.

Soil.—In the lower valleys is a red clay loam, derived principally from lime-

stone, with a few small areas of alluvium along the creeks. Mountain soils are derived from quartzites and schists and are light colored and rather inferior.

Agricultural value.—The lowlands are very productive. About 3,000 acres are well adapted to agriculture. The mountain lands are suitable only for timber growing.

Timber trees.—White oak, 25 per cent; other oaks, 20 per cent; chestnut, 20 per cent; hemlock, 5 per cent; white pine, 1 per cent; other species, 29 per cent.

Yield.—Log timber, 8,560 M feet B. M.; small wood, 205,440 cords.

Demand.—The best log timber brings from $1 to $3 per thousand feet on the stump.

Accessibility.—The longest haul is about 16 miles, by a rough and hilly wagon road, to Crocketts or Wytheville. The northward slopes are generally smooth and offer no special difficulty to logging.

Fire.—Frequent fires overrun the whole tract. The drier portions along the ridges have been severely burned and most of the timber killed.

Second growth.—There is about a half stand of saplings of good timber species on this tract. Much of the land has been cut over for charcoal, and on such tracts the stand if good. On the ridges where much burned, the stand is deficient.

Undergrowth.—In general, light. There is but little laurel, and but few seedlings and shrubs under the trees and saplings.

Reproduction.—Free, except for fire.

Rate of growth.—Medium.

Water power.—Limited, except on Cripple Creek, along which there are several good mill sites.

Ownership.—Mining companies own most of the mountain lands.

Occupancy.—About 50 families are now living on this tract.

Prices of land.—The farm lands are worth about $30 per acre; mountain lands, from $1 to $5.

SPEEDWELL DISTRICT (WYTHE COUNTY, VA.).

Boundaries.—On the north, Cripple Creek; on the east, the western divide of Francis Mill Creek; on the south, the crest of Iron Mountain; on the west, the eastern divide of Kinser Creek.

Area.—Total, 20 square miles; cleared, 3.25 square miles; wooded, 16.75 square miles.

Surface.—Hilly to mountainous.

Soil.—In the lower valleys the soil is derived largely from limestone, and is a red clayey loam; in the mountains it is derived from quartzites and schists, and is light colored and porous.

Agricultural value.—About 2,000 acres are well adapted to mixed farming.

Timber trees.—Chestnut, 20 per cent; chestnut oak, 8 per cent; white oak, 10 per cent; red oak, 6 per cent; black oak, 5 per cent; cucumber, 2 per cent; gum, 3 per cent; birch, 3 per cent; maple, 5 per cent; hemlock, 3 per cent; linn, 4 per cent; white pine, 1 per cent; other species, 30 per cent.

Yield.—Log timber, 7,520 M feet B. M.; small wood, 107,000 cords.

Demand.—The best of the timber brings from $1 to $3 per thousand feet on the stump, according to accessibility.

Accessibility.—The longest haul is about 12 miles, by fair wagon road, to Crockett station on the Norfolk and Western Railway. The slopes are less steep and the brush less abundant than usual.

Fire.—On the ridges fires have been frequent and severe; about 1,600 acres have been severely burned, and light fires have overrun most of the remainder.

Second growth.—Along the clearings, where somewhat protected from fire, there are usually good stands of saplings. Large areas have been cut for charcoal which was used in the Speedwell furnace. These areas are now, as a rule, well stocked with saplings. On the ridges saplings are deficient because of the fires.

Undergrowth.—There are some laurel thickets along the streams, but in general the tract is not brushy.

Reproduction.—Free, except for fires.

Rate of growth.—Medium.

Water power.—Near Speedwell there are several good sites for mills using a moderate amount of power.

Ownership.—Unknown.

Occupancy.—There are about 18 families living on this tract besides those in the village of Speedwell.

Prices of land.—Farm lands are worth from $30 to $50 per acre; mountain lands, from 50 cents to $2.

KINSER CREEK DISTRICT (SMYTH AND WYTHE COUNTIES, VA.).

Boundaries —On the east, the Dry Branch divide on the south; the summit of Iron Mountain; on the west and north, the divide between Horns Branch and Cripple Creek.

Area.—Total, 18.25 square miles; cleared, 2.50 square miles; wooded, 15.75 square miles.

Surface.—About 2 square miles of the lower portion of the basin are undulating to rolling. The remainder is hilly or mountainous.

Soil.—The soil of the lowlands is a red loam, partly alluvial and very fertile, especially along Horns Branch; that of the mountains is light colored and porous.

Agricultural value.—About 2,000 acres in the lowlands are adapted to agriculture. The mountain lands are too steep and have too light a soil for cultivation.

Timber trees.—Chestnut, 20 per cent; chestnut oak, 8 per cent; white oak, 10 per cent; red oak, 6 per cent; black oak, 5 per cent; cucumber, 2 per cent; gum, 3 per cent; birch, 3 per cent; maple, 5 per cent; hemlock, 3 per cent; linn, 4 per cent; white pine, 1 per cent; other species, 30 per cent.

Yield.—Log timber, 11,472 M feet B. M.; small wood, 152,640 cords.

Demand.—Log timber is worth from $1 to $3 per thousand feet on the stump.

Accessibility.—The longest haul is 14 miles, by a bad wagon road, to Rural Retreat on the Norfolk and Western Railway. The mountain side is steep but offers no especial difficulty to logging.

Fire.—Fires have been unusually severe in this district. Practically all of the timber on 9 square miles on the crests of the mountain and the spurs has been killed, except some scattered black pine. Fires have run lightly over all of the remaining forest, except that portion north of Horns Branch which is isolated by clearings.

Second growth.—Most of the coves have a good stand of saplings, but the ridges are deficient in young trees, owing to fire. The isolated wood lots are very well stocked with saplings.

Undergrowth.—The whole tract is brushy with sprouts, seedlings, and shrubs.

Reproduction.—Free, except where the seedlings have been injured by fire.

Rate of growth.—Medium.

Water power.—Limited. The creeks are not large and Horns Branch is very inconstant.

Ownership.—Local.

Occupancy.—About 20 families are living in this district.

Prices of land.—Farm lands are worth from $15 to $50 per acre; mountain lands, from 50 cents to $2.

CRIPPLE CREEK DISTRICT (SMYTH COUNTY, VA.).

Boundaries.—On the north, Cripple Creek; on the east, Horns Branch divide; on the south, the summit of Iron Mountain; on the west, Cressy Creek divide.

Area.—Total, 9.75 square miles; cleared, 2.25 square miles; wooded, 7.50 square miles.

Surface.—The lowlands are undulating to rolling; [illegible] per cent of the tract is mountainous.

Soil.—The mountain slopes have a light porous loam; the lowlands have a red clayey loam.

Agricultural value.—About 1,200 acres are adapted to mixed farming.

Timber trees.—Chestnut, 20 per cent; chestnut oak, 8 per cent; white oak, 10 per cent; red oak, 6 per cent; black oak, 5 per cent; cucumber, 2 per cent; gum, 3 per cent; birch, 3 per cent; maple, 5 per cent; hemlock, 3 per cent; linn, 4 per cent; white pine, 1 per cent; other species, 30 per cent.

Yield.—Log timber, 7,008 M feet B. M.; small wood, 63,800 cords. The best log timber is worth from $1 to $2 per thousand feet on the stump.

Accessibility.—The nearest railroad point is 15 miles from the remotest part of this tract by a rough and hilly wagon road. The mountain slopes are brushy but otherwise not difficult to log.

Fire.—Fires have been frequent and severe, and have killed about half of the forest. Much of the log timber has been destroyed and new growth has been prevented.

Second growth.—On the mountains deficient because of fire, but some isolated wood lots in the lowlands have a very good stand of oak and chestnut.

Undergrowth.—Brushy with sprouts, seedlings, and shrubs.

Reproduction.—Seedlings and sprouts start freely and are generally killed by fire.

Rate of growth—Medium to rapid, according to soil and moisture.

Water power.—Small and inconstant.

Ownership.—Most of the holdings are local and small.

Occupancy.—About 15 families are living on this tract.

Prices of land.—Mountain lands are worth about $2 per acre; farm lands, from $10 to $50.

BRUSH CREEK BASIN (ALLEGHANY COUNTY, N. C.).

Area.—Total, 17.50 square miles; cleared, 4.50 square miles; wooded, 13 square miles.

Surface.—Rolling to mountainous.

Humus and litter.—Nearly all consumed by the frequent fires.

Soil.—Light, owing to fire and wash. The mountain sides are loam, the foothills clay, and the creek bottoms sandy.

Agricultural value.—Slight; corn and grass yield very light crops, except on the mountains.

Timber trees.—Oaks, 60 per cent; white pine, 10 per cent; black pine, 3 per cent; hemlock, 5 per cent; chestnut, 10 per cent; others, 12 per cent.

Yield.—Log timber, 14,720 M feet B. M.; small wood, 140,800 cords.

Demand.—Slight. Too far from market.

Accessibility.—The south slope of Buck Mountain is very steep, and there is much laurel brush on moist land. Otherwise logging is not difficult, but the district is remote from rail.

Fire.—Burns are common but not severe, except on the south slope of Bull-head.

Second growth.—Deficient, owing to the great number of old and defective trees.

Undergrowth.—Much laurel in ravines; huckleberry brush and seedlings on ridges.

Reproduction.—Deficient, owing to brush and fire.

Rate of growth.—Medium.

Water power.—Scant; enough for sawmills and gristmills only.

Ownership.—Mostly held by resident farmers.

Occupancy.—About 35 families living on this tract.

Prices of land.—From 50 cents to $15 per acre.

SOUTH FORK OF HOLSTON RIVER BASIN (SOUTHERN TRIBUTARIES ONLY).

Topography.—This area comprises the northern slope of the Unaka Range, between Watauga and New rivers, and is principally a long, narrow strip of steep mountain side, having a northern exposure and altitudes of from 2,500 to nearly 6,000 feet. In addition to this uniform tract this drainage system comprises the semicircular portion of the plateau drained by Beaver, Tennessee Laurel, Green Cove, and White Top Laurel creeks, which join and cut through the mountain range near Damascus, Va.

Erosion is less marked in this area than in most others, a fact which is probably due to the larger proportion of woodland.

Tennessee Laurel Creek is, however, subject to sudden rises, flooding the narrow bottom lands and endangering the lives of travelers who must cross the numerous fords in the gorge. There is also much erosion of soil on the older neglected fields of the tributaries of Tennessee Laurel Creek, and on the poor portions of the foothills of Holston Mountain.

This district has an area of 233,280 acres, of which 77 per cent is wooded.

Soil.—In this area are two distinct classes of lands, mountain slopes and valleys. The mountain slopes, steep and principally underlain by quartzite, have a light soil with thorough drainage both on surface and underground, while the valleys have deep, loamy, and remarkably fertile soils.

Agriculture.—On Tennessee Laurel Creek substantially all the available land is under cultivation, but along Shady Valley and White Top Laurel creeks, only a

FORESTS REDUCED BY FIRE AND GRAZING, DOE RIVER GORGE, TENNESSEE.

small portion of the arable land is cleared. Holston River bottom is cleared to the foothills of the mountain. This land is well adapted to diversified farming, but is now devoted principally to corn and grazing.

The forest.—Excepting a few small mountain pastures, all the mountain ridges are wooded, and both east and west of Damascus are large areas of unbroken forest, covering both mountain and valley. The north slope of Holston Mountain is also entirely wooded. The forest contains 462,170 M feet B. M. of log timber and 2,793,080 cords of small wood.

The forest of this drainage area varies naturally with the soil, altitude, and exposure, and has also been seriously modified by fires. The northern slopes of Holston and Iron mountains are lightly timbered with oak, black pine, chestnut, and gum, with some hemlock and white pine in ravines, nearly all culled. The southern slopes of the same mountains, and especially the lower portions, are better wooded, except where cleared or deadened for grazing, and have some heavy stands of hemlock and white pine, among which hard woods are freely distributed.

The steep slopes west of Damascus and east of Como Gap are in a very inferior forest condition, owing largely to the long-continued prevalence of fires, which have not only prevented a vigorous growth, but have even driven out the most valuable species.

Over the entire area the proportions of species are as follows:

Proportions of species in South Fork of Holston River basin.

	Per cent.
Oaks	40
Hemlock	7
Ash	1
Black gum	2
Maple	4
Shortleaf pine	1
Chestnut	10
Spruce	1
Buckeye	1
Beech	1
Hickory	3
White pine	12
Poplar	1
Linn	2
Birch	2
Black pine	2
Other species	10

The trees of the ridges and higher north slopes are short and crooked, and, as a rule, the land is very imperfectly stocked and also very brushy. The forest

in some of the tributary basins is in excellent condition, having more moisture and better soil, and having been less injured by fire.

Except on the driest portions, lands cut or burned over are quickly restocked with valuable species, while the dry ridges and summits are soon occupied by chestnut and oak sprouts or black pine, gum, sourwood, or trees of similar value.

Prevention of fire and judicious thinning would soon develop a valuable forest on these north slopes, where now there is very little material that is marketable.

CRESSY CREEK DISTRICT (SMYTH COUNTY, VA.).

Boundaries.—On the north, the South Fork of Holston River; on the east, Cripple Creek divide; on the south, the summit of Iron Mountain; on the west, the Dickey Creek divide.

Area.—Total, 8 square miles; cleared, 1.25 square miles; wooded, 6.75 square miles.

Surface.—Rolling to mountainous.

Soil.—On the higher portions the soil is derived principally from quartzites and schists, and is a light-colored loam; on the lowlands, however, it is derived partly from limestone, and is a red clayey loam.

Agricultural value.—About 800 acres are adapted to diversified farming. The remainder has too light a soil, in view of the steepness of the slopes and the rapid erosion.

Timber trees.—Chestnut, 20 per cent; chestnut oak, 8 per cent; white oak, 10 per cent; red oak, 6 per cent; black oak, 5 per cent; cucumber, 2 per cent; gum, 3 per cent; birch, 3 per cent; maple, 5 per cent; hemlock, 3 per cent; linn, 4 per cent; white pine, 1 per cent; other species, 30 per cent.

Yield.—Log timber, 6,240 M feet B. M.; small wood, 69,600 cords.

Demand.—The best of the timber has been culled. The remainder brings from $1 to $2.50 per thousand feet on the stump.

Accessibility.—The remotest part of the tract is about 15 miles, by a rough and hilly wagon road from the nearest railroad point on State Creek. The mountain sides are not especially difficult of access.

Fire.—Fires have been repeated and the forest is greatly reduced. In recent years, however, the fires seem to have been less severe.

Second growth.—Some very good stands of saplings are found in the upper portion of the basin. On the ridges, where most frequently burned, much black pine is coming in.

Undergrowth.—Light, except near the streams where dense thickets of laurel occur.

Reproduction.—Seedlings and sprouts start freely on old cuttings and burns. Chestnut and white pine are the most promising species for reproduction.

Rate of growth.—Medium.

Water power.—On the lower portion of the stream moderate powers could be secured, but the flow is inconstant and hard to regulate.

Ownership.—Most of the land is held by resident farmers.

Occupancy.—About 10 families are living in this basin.

Prices of land.—Mountain lands bring from 50 cents to $2 per acre; farm lands, from $10 to $25.

DICKEY CREEK DISTRICT (SMYTH COUNTY, VA.).

Boundaries.—On the north, the Rye Valley divide; on the east, the Cressy Creek divide; on the south, the summit of Iron Mountain, and on the west, the Como Creek divide.

Area.—Total, 15.50 square miles; cleared, 1.25 square miles; wooded, 14.25 square miles.

Surface.—Rolling to mountainous.

Soil.—On the upper slopes the soil is a porous loam derived from quartzites and schists, while in the lowlands it is a red clayey loam, derived partly from limestone and partly from the wash from the hills.

Agricultural value.—The upper slopes have no value for agriculture, but about 1,000 acres in the lowlands are well adapted to diversified farming.

Timber trees.—White oak, 15 per cent; red oak, 5 per cent; black oak, 5 per cent; chestnut oak, 5 per cent; gum, 3 per cent; linn, 2 per cent; cucumber, 2 per cent; maple, 2 per cent; chestnut, 20 per cent; birch, 5 per cent; buckeye, 5 per cent; other species, 31 per cent.

Yield.—Log timber, 10,810 M feet B. M.; small wood, 144,800 cords.

Demand.—The best oak has brought $2.50 per thousand feet on the stump.

Accessibility.—The nearest haul would be about 15 miles over Brushy Mountain, by a rough and hilly wagon road, to a branch of the Norfolk and Western Railway on State Creek. The mountain sides are brushy, but not especially difficult to log.

Fire.—Fires have been frequent, and along the spurs and ridges of the divides have greatly injured the forest.

Second growth.—On the upper portion of this basin there are some very good stands of saplings, but in general the supply is deficient because of numerous fires.

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Undergrowth.—Dense laurel thickets are found along the streams and on the north slopes. The burns also are very brushy with sprouts and seedlings, but much of the southern slopes have very little brush.

Reproduction.—Seedlings of oak, chestnut, cherry, etc., start freely and are very liable to destruction by fire.

Rate of growth.—Medium.

Water power.—Limited. A fair site for a mill requiring a moderate amount of power is near the mouth of the creek.

Ownership.—The greater portion is held by local residents.

Occupancy.—About 10 families are now living in this valley.

Prices of land.—Farm lands bring from $15 to $30 per acre; mountain lands, from $1 to $5.

RYE VALLEY DISTRICT (SMYTH COUNTY, VA.).

Boundaries.—On the north, the South Fork of Holston River; on the east and south, the Dickey Creek divide; on the west, the Como Creek divide.

Area.—Total, 4.50 square miles; cleared, 1.75 square miles; wooded, 3.75 square miles.

Surface.—The lower portion of the valley, substantially all cleared, is undulating to rolling; the remainder is mountainous.

Soil.—Light loam.

Agricultural value.—The lowlands, comprising about 1,100 acres, are well adapted to diversified farming; the remainder is too steep for cultivation.

Timber trees.—The oaks constitute about 70 per cent; chestnut, 10 per cent; white pine, 2 per cent; hemlock, 5 per cent, and other species, 13 per cent.

Yield.—Log timber, 1,200 M feet B. M.; small wood, 24,000 cords.

Demand.—The remaining timber is of very little value; some of the best might bring $1 per thousand feet on the stump.

Accessibility.—This tract is within 5 miles of a branch of the Norfolk and Western Railway, but the wagon road to the nearest point lies over a steep and rough mountain ridge.

Fire.—Fires have been frequent and severe, much timber has been killed or injured, and much of the forest has been reduced to brush.

Second growth.—Deficient because of the prevalence of fire.

Undergrowth.—There are many sprouts and seedlings among the brush that usually follows the fires.

Reproduction.—Seedlings start freely, but are soon killed by the fires.

Rate of growth.—Medium.

Water power.—There is very little power on the South Fork of Holston River.

Ownership.—Entirely local.

Occupancy.—About 15 families are now living in this valley.

Prices of land.—Farm lands are worth from $10 to $60 per acre; mountain lands, from $1 to $2 per acre.

COMO CREEK BASIN (SMYTH COUNTY, VA.).

Area.—Total, 15.75 square miles; cleared, 2.50 square miles; wooded, 13.25 square miles.

Surface.—Mountainous.

Soil.—On the ridges the soil is light and porous; in the coves it is only moderately fertile. There are small areas of limestone soil in the lower valley.

Agricultural value.—On the lowlands corn, grass, and grain do well, but the mountain lands are too steep and rough for farming. About 1,200 acres of this basin are adapted to agriculture.

Timber trees.—White oak, 10 per cent; red oak, 10 per cent; chestnut oak, 3 per cent; chestnut, 20 per cent; cucumber, 10 per cent; linn, 5 per cent; birch, 10 per cent; maple, 10 per cent; hemlock, 5 per cent; white pine, 1 per cent; other species, 16 per cent.

Yield.—Log timber, 35,760 M feet B. M.; small wood, 166,400 cords.

Demand.—The best of the remaining timber would bring from $1 to $2.50 per thousand feet on the stump.

Accessibility.—The remotest part of this tract is nearly 20 miles, by a rough and often muddy wagon road, from the railroad at Marion. The mountain sides are steep, rocky, and brushy. Logging would be difficult.

Fire.—The summits of the ridges have been severely burned. The slopes have been occasionally overrun by light fires.

Second growth.—Saplings are abundant, except on the ridges and drier slopes.

Undergrowth.—Dense laurel and other brush cover the north slopes and the ravines.

Reproduction.—Free on close cuttings protected from fire; elsewhere deficient.

Rate of growth.—Rapid.

Water power.—On the lower portion of the creek and on the South Fork of Holston River are several favorable sites for factories using a moderate power.

Occupancy.—About 10 families are now living in this basin.

Prices of land.—Mountain land is worth from $2 to $6 per acre; farm land, from $10 to $30 per acre.

HOLSTON DISTRICT (WASHINGTON AND SMYTH COUNTIES, VA.).

Boundaries.—On the north, the wagon road leading from Damascus to Holston Mill: on the east, the South Fork of Holston River and Como Creek divide; on the south, the summit of Iron Mountain; on the west, Laurel Creek.

Area.—Total, 76.75 square miles; cleared, 24.75 square miles; wooded, 52 square miles.

Surface.—Rolling to mountainous.

Soil.—The soil of the lower lands has been derived largely from limestone, and is a red clayey loam; that of the mountain sides is derived largely from quartzite and schists, and is a light porous loam.

Agricultural value.—In general, slight; the mountain side is too steep, and even much that has been cultivated is now badly washed and worthless. Some 12,000 acres, however, are adapted to mixed farming.

Timber trees.—Oaks, 45 per cent; chestnut, 20 per cent; hemlock, 8 per cent; white pine, 1 per cent; other species, 26 per cent.

Yield.—Log timber, 74,720 M feet B. M.; small wood, 392,040 cords.

Demand.—The best of the remaining log timber is worth from $1 to $3 per thousand feet on the stump, according to accessibility.

Accessibility.—The remotest part of this tract is about 15 miles, by a poor and rough wagon road, from the Norfolk and Western Railway at Chilhowie, Va., or from the Virginia-Carolina Railway at Damascus, Va.

Fire.—Light fires have run over most of this tract, but severe fires killing the log timber have been exceptional. The forest is very poor because of these fires.

Second growth.—The stand of saplings is, in general, deficient because of the frequency of fire.

Undergrowth.—In general the tract is very brushy, with sprouts, seedlings, and shrubs.

Reproduction.—Naturally free, but the abundant brush and the frequent fires prevent a dense stand of seedlings.

Rate of growth.—Medium.

Water power.—There are favorable mill sites on the South Fork of Holston River and on Laurel Creek; elsewhere there is only power enough for local grist and saw mills.

Occupancy.—About 70 families are now living on this tract.

Prices of land.—Mountain land is worth from $1 to $3 per acre; farm land, from $5 to $40 per acre.

NORTH SIDE OF HOLSTON MOUNTAIN (WASHINGTON COUNTY, VA., AND SULLIVAN COUNTY, TENN.).

Boundaries.—The South Fork of Holston River on the north, the crest of Holston Mountain on the south, and the Virginia and Southwestern Railway on the west.

Area.—Total, 120 square miles; cleared, 24 square miles; wooded, 96 square miles.

Surface.—The bottom lands along the river are narrow and interrupted. The foothills are rolling to hilly and often stony. The ascent of the slope is moderate to an elevation of about 2,500 feet, above which it is very steep and rocky and capped by quartzite ledges, which face northwestward.

Soil.—Light and porous, except for the alluvial portions near the river and along the larger tributaries, and for about 10 square miles of clayey limestone lands in the lower foothills.

Agricultural value.—About 12 per cent of the whole tract is adapted to agriculture. The principal crop is corn, but most of the rough land is kept in grass for grazing purposes.

Timber trees.—Oak, 40 per cent; chestnut, 20 per cent; hemlock, 10 per cent; white pine, 5 per cent; other species, 25 per cent.

Yield.—Log timber, 92,160 M feet B. M.; small wood, 768,000 cords.

Demand.—The best log timber brings from $1 to $5 per thousand feet on the stump. Most of the tract has been culled, and the remaining timber is of inferior quality.

Accessibility.—Very poor wagon roads lead from the railroad up the creek toward the mountain. Some tramways have also been built well into the mountain coves, but the main mountain ridge is steep and hilly, and difficult of access.

Fire.—Fires have been frequent and the forest has been greatly reduced. But little log timber has been killed, though the young growth has been greatly injured.

Second growth.—Among the foothills, where the woodland has been closely culled for charcoal or building timber and is somewhat protected from fire, saplings are abundant, but on mountain slopes remote from clearings the stand is deficient because of the fires and the remaining old trees.

Undergrowth.—Wherever the stand of tree seedlings is deficient there is an abundance of huckleberry, laurel, azalea, and scrub oak.

Reproduction.—Reproduction is very free, except as hindered by fire.

Rate of growth.—Rapid, except on the driest ridges.

Water power.—There are sites for numerous small mills, but the streams are inconstant and the water is difficult to govern. There are some excellent powers, however, along the South Fork of Holston River.

Occupancy.—About 300 families are now living on this tract, most of them within 2 miles of the river.

Prices of land.—The mountain ridges are usually valued at 50 cents per acre, timber coves are $2 to $5 per acre, while farm lands range from $25 to $30 per acre.

SHADY VALLEY DISTRICT (WASHINGTON COUNTY, VA., AND JOHNSON COUNTY, TENN.).

Boundaries.—The crest of Holston Mountain on the northwest and the crest of Iron Mountain on the southeast, including the entire drainage basin of Beaver Dam Creek.

Area.—Total, 33 square miles; cleared, 5 square miles; wooded, 28 square miles.

Surface.—About 5 square miles in the west-central portion of the valley are undulating to hilly; the remainder is mountainous.

Soil.—Where the slopes are gentle the land is remarkably fertile; the soil is a clayey loam derived partly from limestone and partly from gneiss and schists. The soil on the mountain slopes is lighter and has very little limestone in its composition.

Agricultural value.—The lower portion of the valley west of Crandall is remarkably fertile and yields excellent crops of corn, wheat, rye, oats, grass, and vegetables. About 10 per cent of this area is adapted to agriculture.

Timber trees.—White pine, 20 per cent; hemlock, 15 per cent; oaks, 20 per cent; chestnut, 15 per cent; other species, 30 per cent.

Yield.—Log timber, 94,720 M feet B. M.; small wood, 390,400 cords.

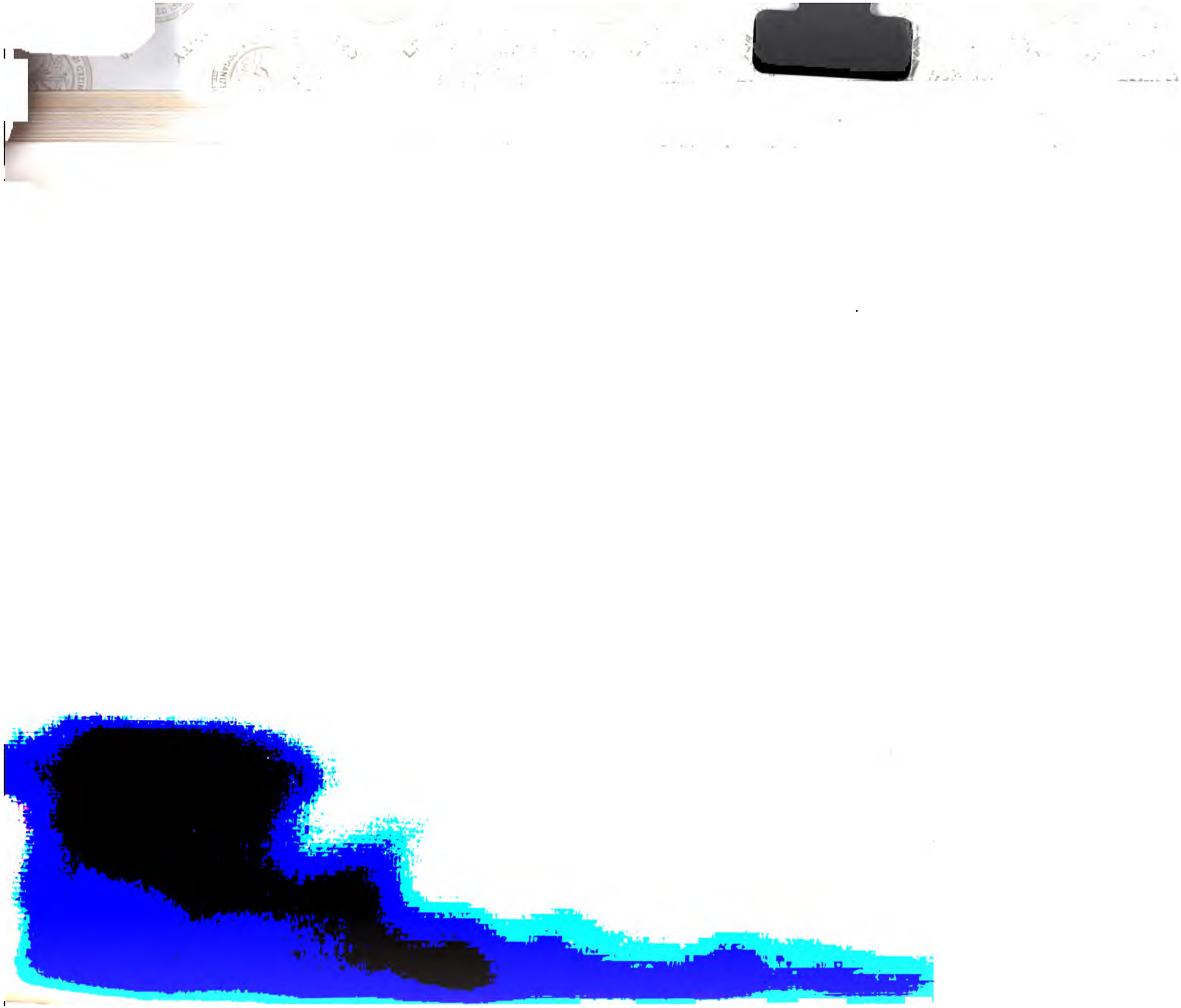
Demand.—The white pine and hemlock log timber is being cut. The stumpage value depends largely upon the cost of transportation.

Accessibility.—A railroad has been built from Abingdon, Va., entirely through this valley. The distance to the railroad nowhere exceeds 4 miles. Logging is not difficult west of Crandall, but east of that place the slopes are very brush and very steep.

Fire.—Only the ridges have been severely burned, and on them little of the logging timber has been killed; but the fires have been sufficiently severe and frequent to prevent the best growth of timber.

Second growth.—Good stands of saplings are found here and there on the lower mountain slopes. In most places there are enough saplings to furnish a good stand of timber trees if the old trees were cut away.

WHITESIDE MOUNTAIN, SOUTHEAST PROFILE, NORTH CAROLINA.



Undergrowth.—Dense thickets of laurel line the ravines, but the laurel brush does not seriously interfere with logging operations, although it is a serious hindrance to reproduction.

Reproduction.—Reproduction is free wherever there has been close cutting or severe burning.

Rate of growth.—Rapid, especially in the lower portion of the valley.

Water power.—There are numerous mill sites along Beaver Dam Creek. Although the stream is not large, the fall is so rapid as to furnish much power by the use of turbine wheels.

Ownership.—The woodland is mostly owned by nonresidents. The agricultural land is divided into small tracts held by resident owners.

Occupancy.—Outside of the manufacturing villages of Damascus, Sutherland, and Crandall there are about 80 resident families.

Prices of land.—The best agricultural lands are valued at $50 per acre, and some of the best timber lands are worth $500 per acre, but much of the mountain land is not worth more than $2 per acre.

LAUREL BLOOMERY DISTRICT (JOHNSON COUNTY, TENN.).

Boundaries.—This tract is bounded on the northwest by the crest of Iron Mountain, on the east by the crest of Stone Mountain, on the north by the divide separating the basin of Laurel Creek from that of White Top Creek, and on the southwest by the divide between this basin and that of Little Doe River.

Area.—Total, 40 square miles; cleared, 16 square miles; wooded, 24 square miles.

Surface.—The principal or southwestern portion of this basin contains about 5 square miles of undulating and rolling land. The remainder is hilly and mountainous.

Soil.—The central portion of the principal valley has much limestone in its composition and is a reddish clayey loam, naturally very fertile. The soil of the mountain slopes is derived from schists, gneiss, and quartzite, and is a light loam of medium fertility.

Agricultural value.—The limestone lands produce excellent crops of grass and are principally devoted to grazing. The pastures of the valley have been considerably enlarged by clearings on the mountain sides and even large portions of the mountain crest are being grazed. About 10 per cent of the whole is adapted to agriculture.

Timber trees.—White oak, 15 per cent; red oak, 10 per cent; chestnut oak, 10 per cent; white pine, 8 per cent; hemlock, 10 per cent; chestnut, 20 per cent; other species, 27 per cent.

Timber trees.—Red oak, 15 per cent; white oak, 10 per cent; black oak, 8 per cent; chestnut oak, 6 per cent; birch, 5 per cent; maple, 10 per cent; linn, 5 per cent; gum, 5 per cent; hemlock, 5 per cent; white pine, 3 per cent; cucumber, 10 per cent; other species, 18 per cent.

Yield.—Log timber, 8,640 M feet B. M.; small wood, 41,040 cords.

Demand.—The best log timber brings from $1 to $3 per thousand feet on the stump.

Accessibility.—The nearest railroad point is Damascus, 10 miles from the remotest portion of the tract. The present wagon road is very rough and hilly, and travel is in constant danger of being stopped by freshets, as a slight rise renders the gorge above Damascus impassable.

Fire.—Fires are not prevalent except on the slope of Pond Mountain and on Chestnut Ridge, where light fires creep through the woods nearly every year.

Second growth.—The stand of saplings varies according to moisture and prevalence of fire. About one-half the land has enough saplings to produce a good stand of timber trees.

Undergrowth.—There is abundant laurel and other brush on north slopes; the ridges and south slopes are but lightly covered with brush.

Reproduction.—Oak, chestnut, birch, and maple all come up freely on old cuttings. White pine and hemlock would reproduce freely if the earth were made bare to receive the seed.

Rate of growth.—Rapid.

Water power.—Limited. Except at the mouth of Valley Creek, where White Top Creek might be dammed, there is only power enough for small sawmills and gristmills.

Ownership.—On Pond Mountain and Chestnut Ridge are considerable areas of woodland held by nonresidents. The greater portion of the valley is held by resident farmers.

Occupancy.—About 40 families are now living in this valley.

Prices of land.—Mountain land brings from $3 to $8 per acre; valley land, from $15 to $45.

WATAUGA RIVER BASIN.

Topography.—This basin, tributary to the Holston, lies almost entirely between the Unakas and the Blue Ridge. The main source of the river is on Grandfather Mountain, a prominent peak of the Blue Ridge, while the last mountain gorge is passed near Elizabethton, Tenn., where the river leaves the mountains. The highest points of this system are Holston Mountain, 4,300 feet; Snake Mountain, 5,594 feet; Rich Mountain, 5,369 feet; Grandfather Mountain,

5,964 feet; Beech Mountain, 5,222 feet; Yellow Mountain, 5,600 feet; Roan Mountain, 6,313 feet, and Ripshin Mountain, 4,800 feet. These are on the border. The interior portion is broken into many subordinate ridges, reaching an altitude of 3,000 to 4,000 feet, with deep, narrow valleys eroded down to an altitude of 3,000 to 2,000 feet.

This basin has an area of 440,992 acres, of which 66 per cent is wooded.

Soil.—The soil of the mountains and ridges is derived directly from granite, gneiss, and schist by decomposition, and much of it is very fertile loam, of excellent physical, as well as chemical, composition. Washing, however, has carried much of the desirable material down to the valleys and left the soil of the ridges inferior, especially on southern slopes. The valley soil is of two general classes—(1) the red clayey loam of the lower foothills and (2) alluvial bottom land, some of which is too porous or too stony, but most of which makes excellent farm land. Altogether, the newly cleared soil is very good, but many burned ridges and old washed fields are in a very poor condition, notably in the valley of Little Doe River.

Agriculture.—Along Stony, Cove, and Roane creeks, Doe River, the main Watauga, and many minor streams are excellent large farms, growing corn, wheat, rye, oats, grass, and vegetables. On almost every creek and in many of the mountain coves are families depending upon the farm for the greater portion or all of their living. While much has been cleared that would be better adapted to timber growing if a timber market were within reach, there is altogether a large area that is best adapted to farming. It is safe to say that a broad economic policy would have little or no more forest land cleared than is now under cultivation, and that attention should be given to keeping what land is cleared in good condition rather than to clearing more to be exhausted and washed until worthless.

Damage by floods.—In this basin it is estimated that on farm land the average damage by floods during the season of 1901 was not less than $1 per acre. This amounts to over $200,000 for the whole basin. Damages to railroads amounted to $250,000, 9 bridges and about 25 miles of track being washed out. The damage to wagon roads can hardly be estimated; at many points entirely new roads were necessary, costing probably $500,000 altogether. Buildings and personal property destroyed swell the total loss to approximately $2,000,000.

The forest.—The remaining forests are on the ridges, mountain ranges, and spurs. These are somewhat dotted with clearings, especially in the granitic region south of the Iron Mountain gorge and along the north slope of Beech Mountain and in the Elk Creek basin. The lowlands have been almost entirely

cleared. The forest contains 841,556 M feet B. M. of log timber and 5,279,100 cords of small wood.

The hard woods, in which the oaks and chestnut predominate, form a mixed forest on most of the area; some ravines carry hemlock almost exclusively, and on some of the ridges white pine is one of the principal timber trees. Spruce is found almost exclusively in some high mountain groups, while beech rules on high mountains and on the crests of some ridges. The proportions of species are as follows:

Proportions of species in Watauga River basin.

	Per cent.
Oaks	40
Hemlock	5
Ash	1
Spruce	1
Linn	3
Other species	7
Locust	1
Chestnut	20
Cucumber	1
Black gum	1
Maple	4
Black pine	1
White pine	5
Poplar	1
Buckeye	2
Beech	2
Hickory	2
Birch	3

Nearly all of the forest has been or is being culled of its most valuable timber, and is rapidly becoming inferior by the predominance of old and defective trees and undesirable species. Fires are preventing a good growth on large portions, although they are seldom so severe as to kill much timber.

Vigorous sprouts, seedlings, and saplings abound on old cuttings and burns, and prevention of fire and some judicious thinning would soon develop a forest that would justify transportation companies in building railroads to haul the products to market.

NORTH END OF BUFFALO MOUNTAIN (WASHINGTON AND CARTER COUNTIES, TENN.).

Boundaries.—On the northeast and south, the foot of the [illegible]; on the west, the Watauga-Nolichucky divide.

Area. Total, 10 square miles; cleared, 1 square mile; wooded, 9 square miles.

Surface. Mountainous.

Soil.—Derived from gneiss, porous and light colored; of medium fertility.

Agricultural value.—Very little. The slopes are too steep and rocky and too liable to erosion.

Timber trees.—White oak, 20 per cent; chestnut oak, 5 per cent; scarlet oak, 3 per cent; black oak, 5 per cent; red oak, 1 per cent; chestnut, 18 per cent; black gum, 2 per cent; hickory, 2 per cent; maple, 3 per cent; hemlock, 5 per cent; white pine, 5 per cent; black pine, 5 per cent; scrub pine, 2 per cent; other species, 24 per cent.

Yield.—Log timber, 10,000 M feet B. M.; small wood, 100,400 cords.

Demand.—The best log timber brings $2 per thousand feet on the stump and $8 per thousand feet at the mill.

Accessibility.—Wagon roads and a railroad reach this tract from Johnson City, 4 miles distant.

Fire.—Fires are usual each winter or spring. The south slopes have been seriously injured.

Second growth.—Abundant saplings are found on north slopes, but on south slopes the stand of young timber of valuable species is deficient, owing to fire and grazing.

Undergrowth.—Dense laurel thickets line the ravines and coves on the north slopes, but the ridges and southern slopes have only sprouts and light underbrush.

Reproduction.—Sprouts and seedlings spring up quickly on north slopes after cutting and burning, but on south slopes are usually soon killed by fire.

Rate of growth.—Rapid, except on the driest portions.

Water power.—Limited; only enough for small grist and saw mills.

Occupancy.—Four families are living about the foot of this mountain.

Prices of land.—From $4 to $10 per acre, according to timber.

LITTLE AND STONE MOUNTAIN DISTRICTS (CARTER AND UNICOI COUNTIES, TENN.).

Boundaries.—On the northwest, the foot of Little Mountain; on the north, the wagon road separating this tract from Gap Creek Mountain; on the east, the summit of Stone Mountain; on the south and west, the Wautauga-Nolichucky divide.

Area.—Total, 10.50 square miles; cleared, 0.75 square mile; wooded, 9.25 square miles.

Surface.—Mountainous.

Soil.—A light porous loam, derived from gneiss.

Agricultural value.—Very little; too steep and rocky and liable to wash.

Timber trees.—White oak, 18 per cent; red oak, 3 per cent; chestnut oak, 4

per cent; black oak, 6 per cent; scarlet oak, 4 per cent; chestnut, 20 per cent; black gum, 3 per cent; hickory, 2 per cent; hemlock, 5 per cent; white pine, 4 per cent; black pine, 3 per cent; other species, 28 per cent.

Yield.—Log timber, 8,720 M feet B. M.; small wood, 10,140 cords.

Demand.—The best log timber brings $1 to $2 per thousand feet on the stump. The average price of sawed lumber at the railroad is about $18 per thousand feet.

Accessibility.—Poor wagon roads lead to Hampton, 6 miles distant, and Johnson City, 8 miles distant, both of which are railroad points.

Fire.—The customary fires have reduced the forests of the driest portion of the southern slopes to a few scattered pines and brush.

Second growth.—On northern slopes there is a fair stand, but on southern slopes there is little second growth.

Undergrowth.—Dense laurel thickets abound on northward slopes and in all ravines and coves. Elsewhere azalea, huckleberry, and sprouts form a light underbrush.

Reproduction.—Were it not for fire, reproduction would be free both by sprouts and seed. Oak and white pine seedlings are most abundant.

Rate of growth.—Rapid, except on the driest ridges and summits.

Water power.—Limited; the streams are small and inconstant.

Occupancy.—Four families are living on this tract.

Prices of land.—Mountain land brings from $2 to $4 per acre.

GAP CREEK MOUNTAIN (CARTER COUNTY, TENN.).

Area.—Total, 7.60 square miles; cleared, 0.35 square miles; wooded, 7.25 square miles.

Surface.—Mountainous. Most of it is very steep.

Soil.—Light, much eroded; derived from gneiss.

Humus.—Light, owing to frequent fires.

Agricultural value.—Very little; too steep and rocky, and soil too light.

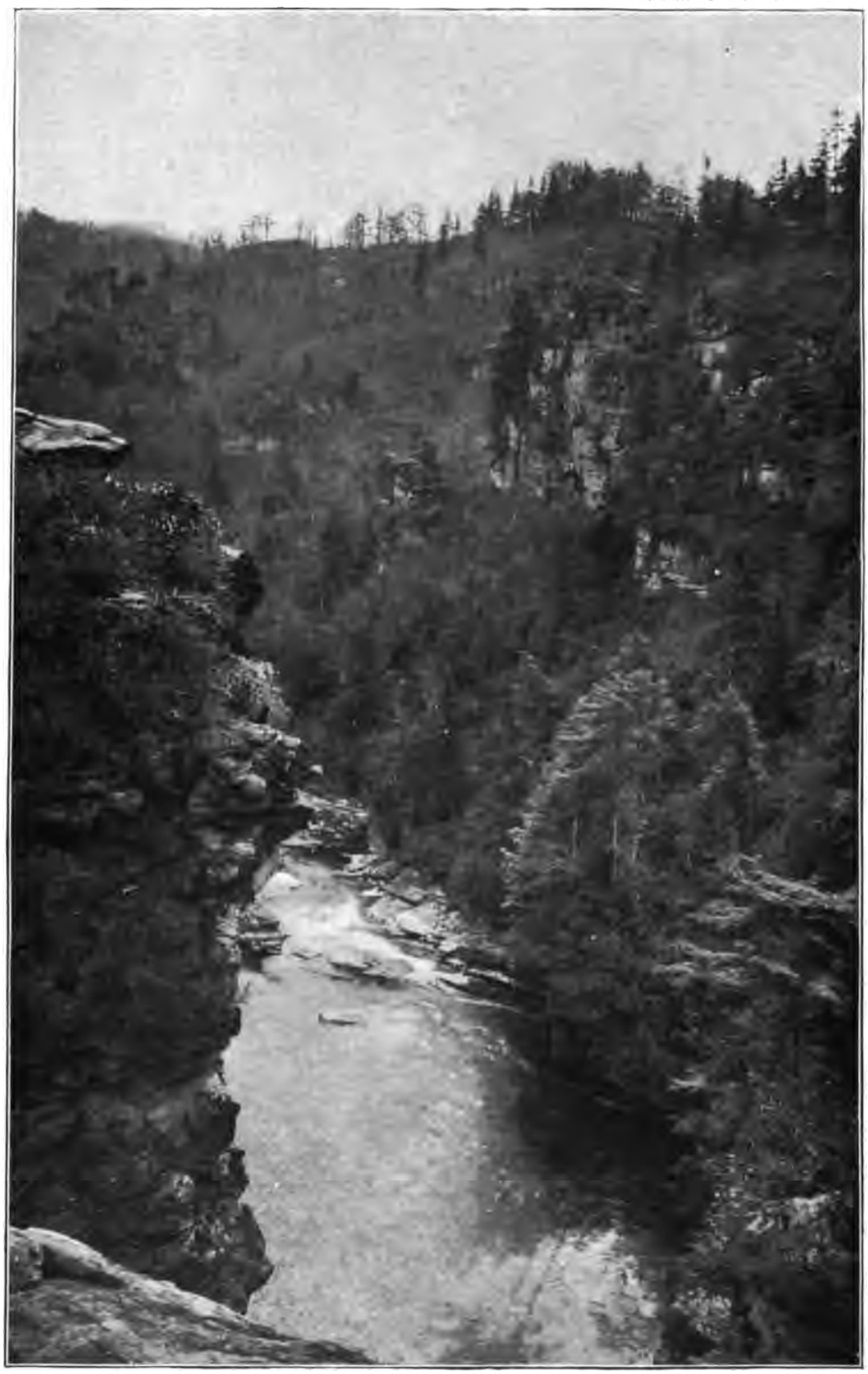
Timber trees.—Same as Cherokee Mountain, but less hemlock and white pine.

Yield.—Log timber, 8,800 M feet B. M.; small wood, 60,000 cords.

Demand.—A common price for the best oak and other log timber is from $1 to $3 per thousand feet on the stump. Sawed lumber brings about $18 per thousand feet at Hampton.

Accessibility.—Wagon roads surround the tract, and a railway forms its eastern boundary. The slopes are in general very steep.

Fire.—Fires have been frequent, and the stand is greatly reduced. The southern ridges especially are very scantily wooded.



GORGE OF LINVILLE RIVER, SOUTH OF BLUE RIDGE.

Accessibility.—Several wagon roads now cross the tract, but to log it thoroughly many additional roads would have to be built. The steep slopes and the dense laurel brush would make logging costly.

Fire.—There have been very few severe fires except on the slopes of Tiger Creek Valley, where timber trees on a few acres have been killed. Light fires have run over the ridges from time to time without much damage to the large trees, but have seriously reduced the supply of saplings and seedlings.

Second growth.—Saplings are abundant, except on the ridges where the fires have been frequent. Here the stand is one-half what it should be.

Undergrowth.—Dense laurel lines the ravines and lower slopes, and huckleberry, azelea, and the sprouts and seedlings of timber trees form an undergrowth of moderate density on the upper slopes and summit.

Reproduction.—Free, except as affected by fires; both sprouts and seedlings spring up quickly after cutting.

Rate of growth.—Rapid.

Water power.—The rapid brooks of this tract would furnish only enough power for small grist and saw mills, but Doe River has abundant water for a large power.

Occupancy.—About 80 families are now living on this tract.

Prices of land.—Mountain land brings from $2 to $10 per acre; farm land, from $5 to $20 per acre.

WHITE ROCK MOUNTAIN (WEST SIDE) (CARTER COUNTY, TENN.).

Boundaries.—This tract lies between the crest of White Rock Mountain and Doe River, and between Allentown and the North Carolina State line.

Area.—Total, 12.50 square miles: cleared, 1.50 square miles; wooded, 11 square miles.

Surface.—Steep and rocky.

Humus and litter.—Very light.

Soil—Derived from gneiss and naturally fertile, but in many places stony and rocky.

Agricultural value.—None; it is too steep and rocky.

Timber trees.—The species are practically the same as on Ripshin Mountain.

Yield.—Log timber, 12,840 M feet B. M.; of small sawlogs, 111,400 cords. This land has been thoroughly culled, and only the oaks and less valuable species remain.

Demand.—From $2 to $4 per thousand feet on the stump is considered a good price.

Accessibility.—A railroad runs along the western boundary of this tract. The

only difficulty to logging, and a considerable one, is getting the logs down the steep and rocky mountain sides.

Fire.—Fires have been frequent and severe; timber is very inferior because of them.

Second growth.—There are very few saplings, because of frequent fires.

Undergrowth.—Light.

Reproduction.—Reproduction is low on account of fires.

Rate of growth.—Medium.

Water power.—Doe River, on the western boundary, would furnish power for a factory of considerable size, except during dry times. It is impossible to hold any great amount of water by dams on this stream.

Occupancy.—There are 8 or 10 families living along the foot of the mountain near Doe River, outside of Roan Mountain village.

Prices of land.—From $1 to $2 per acre.

LAUREL FORK DISTRICT (CARTER COUNTY, TENN.).

Boundaries.—The wagon road from Hampton to Butler forms the northern boundary, elsewhere the divides which separate this basin from that of Doe River on the west and Elk Creek on the east.

Area.—Total, 21.50 square miles; cleared, 1.50 square miles; wooded, 20 square miles.

Surface.—Hilly to mountainous.

Soil.—The soil is derived from gneiss and is naturally very fertile, but owing to steep slopes is liable to wash.

Agricultural value.—Less than 1 per cent of the area is adapted to agriculture, as most of it is too steep for cultivation.

Timber trees.—The principal species are white pine, 10 per cent; hemlock, 6 per cent; oaks, 40 per cent; chestnut, 20 per cent; poplar, ash, cherry, walnut, birch, linn, buckeye, etc., together, 24 per cent.

Yield.—Log timber, 71,040 M feet B. M.; small wood, 90,880 cords.

Demand.—This tract is being logged and the timber hauled to the Cranberry Railway. Stumpage values do not exceed $2 per thousand feet.

Accessibility.—The basin is drained through a sharp, deep canyon, unfavorable to roads. The logs now being cut are hauled by tramway across White Rock Mountain to the railway below Roan Mountain station.

Fire.—Only the ridges and steeper slopes have been repeatedly burned.

Second growth.—Saplings are abundant, except on the driest ridges and steepest slopes.

Undergrowth.—Dense laurel thickets are numerous. The ridges are usually passable for horses.

Reproduction.—Free.

Rate of growth.—Rapid.

Water power.—A fall of several hundred feet, about 4 miles from Hampton, affords much power even with the moderate amount of water furnished by the stream.

Occupancy.—About 8 families are now living on this tract.

Prices of land.—From $1 to $5 per acre.

POND MOUNTAIN DISTRICT (CARTER COUNTY, TENN.).

Boundaries.—Watauga River and Elk Creek on the north and east, and the Laurel Fork divide on the south and west.

Area.—Total, 33.50 square miles; cleared, 5.25 square miles; wooded, 28.25 square miles.

Surface.—Moderately mountainous.

Soil.—Fertile loam.

Agricultural value.—About 5 per cent of this land is adapted to agriculture.

Timber trees.—White pine, 12 per cent; hemlock, 15 per cent; chestnut, 15 per cent; white oak, 10 per cent; red oak, 10 per cent; chestnut oak, 5 per cent; black oak, 5 per cent; cucumber, 2 per cent; linn, 4 per cent; buckeye, 2 per cent; poplar, ash, maple, cherry, birch, gum, and others, 20 per cent.

Yield.—Log timber, 67,680 M feet B. M.; small wood, 361,600 cords.

Demand.—Stumpage prices range from $1 to $4 per thousand feet.

Accessibility.—The slopes are steep and brush is abundant, but tramways are feasible.

Fire.—The ridges have been scorched, but the damage on this tract is less than in adjacent areas.

Second growth.—Saplings are abundant.

Undergrowth.—Light on ridges; dense elsewhere.

Reproduction.—Free with pine, chestnut, and oak.

Rate of growth.—Rapid.

Water power.—Fair in Elk Creek and excellent in Watauga River.

Occupancy.—About 60 families are now living on this tract.

Prices of land.—From $2 to $10 per acre.

IRON MOUNTAIN DISTRICT (CARTER COUNTY, TENN.).

Boundaries.—Watauga River on the northeast, Doe River on the southwest, and the foothills of the mountain on the northwest and southeast.

Area.—Total, 7 square miles; cleared, 1 square mile; wooded, 6 square miles.

Surface.—Mountainous, steep, and rocky.

Soil.—Light loam.

Agricultural value.—About 6 per cent of this land is adapted to agriculture.

Timber trees.—Oaks, 40 per cent; pines, 10 per cent; chestnut, 10 per cent; other species, 40 per cent.

Yield.—Log timber, 7,040 M feet B. M.; small wood, 47,680 cords.

Demand.—The best of the standing timber brings $2 to $4 per thousand feet.

Accessibility.—Wagon roads surround the tract on all sides, and railroads border it on the northeast and southwest. The slopes are steep and rocky, and the ravines are very brushy.

Fire.—Fires are very frequent, and the forest is of inferior quality because of them.

Second growth.—Saplings are inferior because of frequent fires. There are not half enough for a good stand.

Undergrowth.—There is a dense cover of brush, consisting of sprouts from cut and burned stumps, a few tree seedlings, and bushes, such as huckleberry, azalea, laurel, and rhododendron.

Reproduction.—Seedlings start freely, but are generally subdued annually by the fires.

Rate of growth.—Rather slow on ridges, but rapid in coves.

Water power.—Abundant power may be found on both Watauga and Doe rivers.

Ownership.—Most of this tract is held by residents.

Occupancy.—Only the foothills are occupied at present.

Prices of land.—From $1 to $5 per acre.

STONY CREEK DISTRICT (CARTER COUNTY, TENN.).

Boundaries.—The summit of Holston Mountain on the north, Iron Mountain on the south, and the Virginia and Southwestern Railway on the west.

Area.—Total, 70 square miles; cleared, 20 square miles; wooded, 50 square miles.

Surface.—There are considerable areas of level to undulating land along Watauga River on the lower portion of Stony Creek. The foothills, comprising about 15 square miles, are rolling to hilly, while the mountain ridges on each side of the valley are high, steep, and rocky.

Soil.—The crests of the mountains being of quartzite, the derived soil is light and porous on the ridges; the slopes are of loam, thoroughly fertile, but quite liable to wash; the lowlands are rather sandy, but when new produce excellent farm crops.

Soil.—The soil is of mixed origin, being derived from quartzite on the mountain crests, gneiss and schist on the slopes, and limestone in the valley bottoms. The alluvial lands of the bottoms are in general very fertile, even those of the foothills being good, but the crests of the ridges and mountains have a light soil considerably effected by fire and erosion.

Agricultural value.—The valley is well adapted to grass, grain, fruits, and vegetables. About 30 square miles are well adapted to farming.

Timber trees.—White oak, 10 per cent; chestnut, 20 per cent; hemlock, 10 per cent; red oak, 10 per cent; chestnut oak, 10 per cent; white pine, 2 per cent; black oak, 5 per cent; other species, 33 per cent.

Yield.—Log timber, 16,000 M feet B. M.; small wood, 499,000 cords.

Demand.—From $1.50 to $4 per acre is paid for the best log timber on the stump.

Accessibility.—The Virginia and Southwestern Railway extends through the entire length of the valley. Wagon roads are numerous among the foothills. The upper mountain slopes remain somewhat difficult of access, though nowhere more than 6 miles from the railroad.

Fire.—Fires are frequent, especially on the ridges on the southern slopes, where the forests have been seriously injured.

Second growth.—On the lands cut clean for charcoal and protected from fire by clearings there is an abundant second growth, but on the ridges and southern slopes the supply is deficient because of the fires.

Undergrowth.—Generally light. There is less laurel than in many of the valleys, and the other brush is not so vigorous as to be a serious obstacle in logging. There are many sprouts and seedlings, but in general these are destroyed by the fires.

Reproduction.—Reproduction is retarded somewhat by brush and fire, but where cut clean and not burned the land is quickly restocked with the species that occupied it before.

Rate of growth.—Medium to rapid.

Water power.—Inconstant. Roane Creek is nearly dry at times, but rises with every rain. During the past season great damage was done by freshets.

Occupancy.—There are about 300 families living in this valley.

Prices of land.—Farm lands bring from $5 to $50 per acre; mountain lands, from $2 to $10 per acre.

FORGE CREEK DISTRICT (JOHNSON COUNTY, TENN.).

Boundaries.—The crest of Forge Mountain forms the northwestern boundary, the North Carolina State line the eastern, and the rim of Roane Creek basin the southwestern.

WATER-POWER DEVELOPMENT AND COTTON MILLS AT COLUMBUS, GA.

Area.—Total, 17.50 square miles; cleared, 7 square miles; wooded, 10.50 square miles.

Surface.—Hilly to mountainous, except in the very narrow and interrupted creek bottoms.

Soil.—The soil is derived principally from gneiss and granite, and is a naturally fertile loam, but owing to the steepness of the slopes is very liable to erosion.

Agricultural value.—Most of the land is too steep for cultivation, only 3 square miles being strictly agricultural. The land would be naturally adapted to grass but for the steepness of the slopes.

Timber trees.—Hemlock, 15 per cent; birch, 10 per cent; beech, 3 per cent; red oak, 5 per cent; white oak, 15 per cent; chestnut oak, 10 per cent; chestnut, 15 per cent; white pine, 2 per cent; other species, 25 per cent.

Yield.—Log timber, 13,632 M feet, B. M.; small wood, 120,800 cords.

Demand.—From $1 to $2 per thousand feet is the common stumpage price for the best of the remaining log timber.

Accessibility.—The nearest railroad station is Maymead. The extreme haul is 9 miles, though the nearest point on the railroad is 3 miles nearer. A wagon road follows the stream through the valley, and branches of it lead over most of the mountain slopes.

Fire.—Except along the crest of Forge Mountain there have been few fires beyond those used in clearing the land.

Second growth.—Saplings are abundant, except on the ridges with southern exposure where fires have been very frequent.

Undergrowth.—Dense laurel thickets cover nearly all the northern slopes. The southern slopes are brushy, with sprouts and shrubs.

Reproduction.—Considerably retarded by brush and fire, but always free on clean cuttings.

Rate of growth.—Rapid.

Water power.—Along the lower portion of the stream are sites for mills of moderate power, but the stream is inconstant and the ground is not favorable for holding water in reservoirs.

Ownership.—The tract is substantially all owned by residents.

Occupancy.—About 100 families are now living in the valley.

Prices of land.—The best farm lands are worth $30 per acre; hilly and ridge farms bring $5 to $10 per acre; while the wild mountain lands are not worth more than $2 per acre.

FISH SPRING DISTRICT (JOHNSON COUNTY, TENN.).

Boundaries.—The crest of Iron Mountain on the north and west, Doe Mountain on the southeast, and Watauga River on the south.

Area.—Total, 24.50 square miles; cleared, 8 square miles; wooded, 16.50 square miles.

Surface.—Rolling to mountainous.

Soil.—In the lowlands the soil is principally red clay, derived from limestone and the wash from the mountains. On the mountain sides it is a porous loam, derived from gneiss, schist, and quartzite.

Agricultural value.—Grass and corn are the best crops, but the hill lands are soon worn out by erosion and either are left bare or become covered with broom grass.

Timber trees.—White oak, 20 per cent; red oak, 10 per cent; black oak, 5 per cent; cucumber, 3 per cent; chestnut, 18 per cent; linn, 2 per cent; chestnut oak, 10 per cent; other species, 32 per cent.

Yield.—Log timber, 18,000 M feet B. M.; small wood, 126,720 cords.

Demand.—The best log timber brings from $1 to $3 per thousand feet on the stump, according to accessibility.

Accessibility.—The Virginia and Southwestern Railway lies within 6 miles of the remotest part of this tract, but the wagon roads leading through the valley are rough and hilly.

Fire.—Fires have been frequent on the mountain ridges and the forest is much depleted, and a large part of the young growth has been destroyed.

Second growth.—The stand of saplings is deficient, owing to the frequency of the fires. The seedlings and sprouts of timber trees form a large proportion of the undergrowth, although in the ravines on north slopes there is laurel to offer a serious obstruction to logging operations.

Reproduction.—Reproduction is free, except as retarded by brush or by fires.

Rate of growth.—Medium.

Water power.—Limited. The best mill site is on a constant-spring stream 10 feet wide and 8 inches deep, rising about 500 feet above the river on the mountain side.

Ownership.—Most of the holdings are owned by local residents.

Occupancy.—About 40 families are now living on this tract.

Prices of land.—Mountain land is valued at $1 to $5 per acre, farming lands from $5 to $25 per acre.

BUCK MOUNTAIN DISTRICT (CARTER AND WATAUGA COUNTIES, TENN.).

Boundaries.—This tract is bounded on the north by Watauga River, on the east and south by the North Carolina State line, and on the west by Elk Creek.

Area.—Total, 16.20 square miles; cleared, 4.9 square miles; wooded, 11.30 square miles.

Surface.—Hilly to mountainous, except about 1 square mile of alluvial land, principally on Elk Creek.

Soil.—Dark loam, derived from gneiss and granite.

Agricultural value.—Grass and fruits do remarkably well. The steepness of the slopes is a great hindrance to agriculture. About 3 square miles of this land are adapted to diversified farming.

Timber trees.—White oak, 15 per cent; red oak, 10 per cent; black oak, 10 per cent; chestnut oak, 10 per cent; chestnut, 20 per cent; cucumber, 6 per cent; gum, 4 per cent; hemlock, 3 per cent; linn, 5 per cent; other species, 17 per cent.

Yield.—Log timber, 12,352 M feet B. M.; small wood, 134,080 cords.

Demand.—The best log timber brings from $1 to $2 per thousand feet on the stump.

Accessibility.—The nearest railroad point is Butler, about 10 miles, by a rough and hilly wagon road, from the remotest part of the tract.

Fire.—Fires have been frequent and the forest is much depleted.

Second growth.—Deficient, because of fires.

Undergrowth.—The whole tract is brushy with laurel, azalea, huckleberry, blackberry, and the seedlings and sprouts of timber trees.

Reproduction.—On close cuttings without fire, oak, chestnut, hickory, white pine, and hemlock spring up quickly.

Rate of growth.—Rapid.

Water power.—Abundant on Watauga River, but on Elk Creek, a stream of considerable size, the flow is inconstant and the supply is difficult to manage.

Ownership.—Mostly divided into small holdings.

Occupancy.—About 35 families are now living on this tract.

Prices of land.—Farm land is worth from $10 to $35 per acre; mountain land, from $1 to $2 per acre.

HATTIE DISTRICT (WATAUGA COUNTY, N. C.).

Boundaries.—The crest of Stone Mountain forms the northern and western boundaries; the divide separating this basin from that of Cove Creek forms the eastern boundary; and Watauga River forms the southern.

Area.—Total, 28.25 square miles; cleared, 12.50 square miles; wooded, 15.75 square miles.

Surface.—Rolling to mountainous.

Soil.—Dark loam, derived from granite and schists, in general very fertile.

Agricultural value.—Much of this land is well adapted to grazing, and the frequent alluvial creek bottoms make excellent hay meadows. About 10 square miles of this tract are well adapted to diversified farming. Fruits and vegetables do remarkably well here.

Timber trees.—White oak, 15 per cent; red oak, 10 per cent; chestnut oak, 5 per cent; chestnut, 20 per cent; gum, 5 per cent; maple, 5 per cent; birch, 10 per cent; other species, 30 per cent.

Yield.—Log timber, 28,640 M feet B. M.; small wood, 198,400 cords.

Demand.—The best log timber brings about $1 per thousand feet on the stump.

Accessibility.—The nearest point of this tract is about 15 miles from the railroad, by a rough and hilly wagon road. Logging for the general market will be unprofitable until a railroad is built up Watauga River, through Watauga County.

Fire.—There have been very few fires, except along the crest of Stone Mountain, where the forest is much depleted.

Second growth.—Saplings are abundant, except near the summit of Stone Mountain.

Undergrowth.—Except for laurel thickets in the ravines and huckleberry and azalea brush on the ridges, the undergrowth is not dense enough to seriously hinder logging operations, although quite an obstruction to reproduction.

Reproduction.—Oak, chestnut, and beech spring up quickly after close cuttings. White pine, hemlock, and poplar are quite abundant on old pastures.

Rate of growth.—Rapid.

Water power.—Abundant on Watauga River, elsewhere only enough for small grist and saw mills.

Ownership.—Nearly all divided into small holdings by resident owners.

Occupancy.—About 140 families are now living on this tract.

Prices of land.—Farm lands bring from $10 to $50 per acre; mountain land about $2 per acre.

KEY STATION DISTRICT (JOHNSON COUNTY, TENN.).

Boundaries.—The divides inclosing the basin of Roan Creek above Rhea Springs.

Area.—Total, 18 square miles; cleared, 8.50 square miles; wooded, [illegible] square miles.

Surface.—Hilly to mountainous.

Soil.—In the bottom of the valley the soil is derived largely from limestone and is a reddish clayey loam; on the mountain slopes it is derived from gneiss and is a porous, gray loam.

Agricultural value.—This valley is adapted to grazing; the grass does well until the land is worn out either by continuous cropping and grazing or by erosion.

Timber trees.—On the east slope of Stone Mountain white pine constitutes about 40 per cent of the timber; elsewhere the composition is, approximately, oak, 30 per cent; chestnut, 20 per cent; hemlock, 6 per cent; white pine, 10 per cent; other species, 34 per cent.

Yield.—Log timber, 13,712 M feet B. M.; small wood, 109,600 cords.

Demand.—The best log timber (not figured) brings about $2 per thousand feet on the stump.

Accessibility.—The Virginia and Southwestern Railway passes within 10 miles of the remotest part of this tract, and poor wagon roads now reach every part of the valley.

Fire.—Fires have been frequent on Stone Mountain, where the forest is in poor condition because of them. The predominance of white pine there is due, no doubt, largely to the prevalence of fire, as the thick bark of this species protects the trunk from injury while other species are killed. Fires also prepare favorable seed beds for the white-pine seeds. The remainder of the valley is largely cleared and the woodlands near the cleared land are thus protected.

Second growth.—Deficient on Stone Mountain because of fire, but elsewhere there are many good stands of saplings.

Undergrowth.—Generally light.

Reproduction.—Deficient because of fire and pasturage, otherwise it would be free.

Rate of growth.—Medium.

Water power.—Limited, as the stream is small and inconstant.

Occupancy.—About 60 families are now living in this basin.

Prices of land.—Farms are worth from $10 to $40 per acre; mountain lands, from $2 to $6 per acre, according to the timber and accessibility.

SOUTHERN TRIBUTARY BASINS OF WATAUGA RIVER (WATAUGA COUNTY, N. C.).

Boundaries.—On the north, Watauga River and Brushy Fork; on the east, the New River divide; on the south, the Watauga County line and the Elk Creek divide; on the west, the Elk Creek divide.

Area.—Total, 86 square miles; cleared, 21 square miles; wooded, 65 square miles.

Surface.—Hilly to mountainous, excepting narrow bottoms along Watauga River and the larger creeks.

Soil.—The soil is derived from gneiss and granite, and is a porous loam, very fertile when new.

Agricultural value.—When first cleared the land is very productive under grain, grass, and vegetables, but often it is so steep as to waste rapidly. About 14 square miles are adapted to agriculture.

Timber trees.—Chestnut, 20 per cent; hemlock, 12 per cent; red oak, 5 per cent; white oak, 10 per cent; chestnut oak, 5 per cent; white pine, 4 per cent; ash, 3 per cent; linn, 3 per cent; yellow birch, 3 per cent; black birch, 3 per cent; sugar maple, 3 per cent; red maple, 3 per cent; hickory, 2 per cent; cucumber, 3 per cent; beech, 4 per cent; gum, 2 per cent; cherry, 1 per cent; poplar, 2 per cent; locust, 1 per cent; other species, 11 per cent.

Yield.—Log timber, 220,800 M feet B. M.; small wood, 716,800 cords.

Demand.—Slight, except for figured woods and the best poplar, cherry, walnut, and ash. Only in the lower portion of the valley can common timber be cut for the general market, elsewhere the demand is local only.

Accessibility.—Butler, on the Virginia and Southwestern Railway, is 10 miles from the nearest point of this tract. The wagon road is very rough and hilly, and the numerous fords are often impassable.

Fire.—Light fires are common, but severe fires are rare. Most of those set are intended to improve pasturage, to aid in gathering chestnuts, or for some reason of similar importance.

Second growth.—Abundant, except on the higher and drier ridges and south slopes.

Undergrowth.—In general brush is abundant, especially along ravines and north slopes.

Reproduction.—Chestnut and oak come in freely after cutting, if protected from fire. White pine and ash are promising for the new forest.

Rate of growth.—Rapid.

Water power.—Abundant on Watauga River.

Occupancy.—About 250 families are living on this tract.

Prices of land.—Mountain land brings from $2 to $5 per acre; farm land, from $10 to $30.

WESTERN TRIBUTARY BASINS OF DOE RIVER ABOVE ROAN MOUNTAIN STATION (CARTER COUNTY, TENN.).

Boundaries.—On the north, the Western North Carolina Railway; on the east and south, the North Carolina State line; and on the west, the western divide of this basin.

Area.—Total, 33.50 square miles; cleared, 8 square miles; wooded, 25.50 square miles.

Surface.—Hilly to mountainous, except in very narrow bottoms along the river and larger creeks.

Soil.—A generally fertile, porous, dark loam, derived principally from gneiss and schists.

Agricultural value.—The creek bottoms have yielded excellent crops of corn and other grains, vegetables, and grass. The hillsides yield good crops when first cleared, but are very liable to wash. About 1,900 acres are adapted to permanent agriculture.

Timber trees.—Chestnut, 20 per cent; white oak, 15 per cent; red oak, 6 per cent; chestnut oak, 3 per cent; cucumber, 5 per cent; buckeye, 10 per cent; linn, 6 per cent; gum, 4 per cent; maple, 5 per cent; poplar, 1 per cent; hemlock, 7 per cent; white pine, 2 per cent; spruce, 2 per cent; other species, 14 per cent.

Yield.—Log timber, 64,320 M feet B. M.; small wood, 323,200 cords.

Demand.—A common price for oaks and other hard woods is $2 per thousand feet. Poplar is higher in proportion to quality.

Accessibility.—The Western North Carolina Railway, bordering this tract, affords an outlet. The longest haul to it is about 8 miles, down grade.

Fire.—Fires, though frequent, have not killed much timber except near the crest of the mountain. Usually this tract is too damp for severe fires.

Second growth.—Saplings of valuable species are abundant.

Undergrowth.—Laurel thickets line the ravines, and even the mountain slopes are usually brushy.

Reproduction.—Seedlings and sprouts spring up quickly after cutting, and valuable species are in large proportion. White pine, spruce, and chestnut are promising species.

Rate of growth.—Rapid.

Water power.—Limited to creeks of medium size.

Occupancy.—About 65 families are living on this tract.

Prices of land.—Mountain land is usually valued at $2 to $5 per acre, while in the foothills farm land brings $15 to $30 per acre.

ELK CREEK DISTRICT (MITCHELL AND WATAUGA COUNTIES, N. C.).

Boundaries.—On the north and east, the divide between the Watauga basin and the Elk Creek basin; on the south, the Linnville divide; and on the west, the Tennessee State line.

Area.—Total, 42 square miles; cleared, 15 square miles; wooded, 27 square miles.

Surface.—Hilly and mountainous, except where alluvial lands occur along creek bottoms, as about Banners Elk and below Cranberry.

Soil.—In general a dark, fertile loam.

Agricultural value.—Grass is very productive on new lands; the alluvial lands are well adapted to corn. In this region there is less erosion because the numerous quartz pebbles protect the surface.

Timber trees.—Chestnut, 16 per cent; white oak, 10 per cent; hemlock, 10 per cent; chestnut oak, 3 per cent; red oak, 3 per cent; maple, 5 per cent; buckeye, 5 per cent; linn, 4 per cent; cucumber, 3 per cent; black oak, 3 per cent; white pine, 2 per cent; gum, 4 per cent; ash, 2 per cent; other species, 30 per cent.

Yield.—Log timber, 58,320 M feet B. M.; small wood, 907,200 cords.

Demand.—Stumpage prices range from $1 to $3 per thousand feet, according to accessibility and quality. Hemlock bark brings $4 and chestnut-oak bark $5 per cord at Elk Park.

Accessibility.—The nearest railroad point is Elk Park, 15 miles, by a rough wagon road, from the remotest part of this tract. Many of the slopes are very steep, and logging is expensive.

Fire.—Though fires are frequent they have not killed much timber, but the forest has been greatly reduced.

Second growth.—Saplings are abundant on the lower slopes, but scant on the upper southern slopes, of Beech Mountain.

Undergrowth.—Brushy with laurel and other shrubs and with sprouts and seedlings.

Reproduction.—Lands cut over are quickly restocked with sprouts and seedlings of chestnut and oak. White pine and hemlock come in rapidly on old pastures. Maple and oak seedlings are usually abundant under timber, and spring up quickly after cutting.

Rate of growth.—Rapid.

Water power.—Elk Creek has abundant fall. The amount of water is enough ror large mills.

Ownership.—The land is held principally by residents, though several large tracts about Hanging Rock and Beech Mountains are owned by nonresidents.

Occupancy.—About 200 families are living in this basin.

Prices of land.—Mountain land is worth from $2 to $5 per acre; farm land, from $15 to $30.

UPPER FALLS OF WHITEWATER RIVER, SOUTHWESTERN NORTH CAROLINA.

COVE CREEK DISTRICT (WATAUGA COUNTY, N. C.).

Boundaries.—On the north, the State line; on the east, the New River divide; on the south, Brushy Fork of Watauga River; on the west, the western divide of the Cove Creek basin.

Area.—Total, 36 square miles; cleared, 21 square miles; wooded, 15 square miles.

Surface.—Along the creek are about 4 square miles of gently-sloping bottom land. The western slopes of Rich and Snake mountains are very steep, but much of the remaining hilly land has slopes moderate enough to be pastured, commonly 20° to 30°.

Soil.—The soil is a dark and porous loam, derived principally from gneiss. It is usually very fertile.

Agricultural value.—When newly cleared this land yielded heavy crops of grain and grass. Much of it is now badly washed, but about 10 square miles are adapted to permanent agriculture.

Timber trees.—Chestnut, 20 per cent; white oak, 10 per cent; red oak, 5 per cent; chestnut oak, 3 per cent; black oak, 3 per cent; hemlock, 5 per cent; white pine, 2 per cent; maple, 5 per cent; beech, 3 per cent; birch, 3 per cent; cucumber, 3 per cent; buckeye, 4 per cent; gum, 3 per cent; ash, 1 per cent; other species, 30 per cent.

Yield.—Log timber, 20,720 M feet B. M.; small wood, 179,200 cords.

Demand.—Local only, except for figured woods.

Accessibility.—The nearest railroad point is on the Virginia and Southwestern Railway, 15 miles distant, by a very rough and hilly wagon road, from the center of this tract. The slopes of Rich and Snake mountains are very steep, but not otherwise difficult to log.

Fire.—The numerous clearings afford good protection from fires for most of the tract. The mountain sides are liable to be burned and bear evidence of some recent severe burning on about 1,500 acres.

Second growth.—Saplings are abundant on most of the woodlands.

Undergrowth.—Generally light.

Reproduction.—Free.

Rate of growth.—Rapid.

Water power.—Limited. Cove Creek is very inconstant; Watauga River would furnish a moderate power.

Ownership.—Local and, except on Snake and Rich mountains, divided into small holdings.

Occupancy.—About 130 families are living in this valley.

Prices of land.—Mountain lands bring from $1 to $5 per acre; farm lands, from $5 to $35.

ELIZABETHTON DISTRICT (CARTER AND UNICOI COUNTIES, TENN.).

Boundaries.—On the north, a line from the north end of Buffalo Mountain to the southwest end of Holston Mountain; on the east, the Virginia and Southwestern Railway; on the south, the foot of Iron, Gap Creek, and Little mountains; and on the west, the eastern foot of Buffalo Mountain.

Area.—Total, 50 square miles; cleared, 38.25 square miles; wooded, 11.75 square miles.

Surface.—Undulating to hilly.

Soil.—Red clay, excepting some alluvium along rivers and some porous loam on the ridges.

Agricultural value.—About 25 square miles are well adapted to mixed farming.

Timber trees.—Oaks, 40 per cent; chestnut, 20 per cent; maple, birch, and beech, 10 per cent; other species, 30 per cent.

Yield.—Log timber, 14,840 M feet B. M.; small wood, 141,200 cords.

Demand.—Markets at Elizabethton and Johnson City offer $8 to $10 per thousand feet for logs at the mill.

Accessibility.—Wagon roads are numerous. Two railroads cross the tract.

Fire.—Well protected by clearings.

Second growth.—Saplings are abundant, but oaks and chestnut prevail over other species.

Undergrowth.—Light.

Rate of growth.—Rapid.

Ownership.—Resident farmers.

Occupancy.—Outside of the town of Elizabethton there are about 250 families.

Prices of land.—From $5 to $60 per acre.

NOLICHUCKY RIVER BASIN.

Topography.—A large portion of this basin lies within the mountain region. Its three principal tributaries, North Toe, South Toe, and Cane rivers, as well as several creeks of large size, are entirely between the two main ridges. Mount Mitchell, the highest peak east of the Rocky Mountains, and Roan Mountain are both on the border of this basin. In the central part is a large portion of hilly agricultural land, and along creeks are many narrow strips of flat alluvial bottom. In cutting through the Unaka Mountains, however, the streams have worn long, deep gorges through the Unicoi, and the narrow tributary valleys of this portion of the basin have rapid torrential streams, narrow and interrupted bottom lands, and very steep and rocky mountain slopes.

The area of the basin is 569,920 acres, of which 76 per cent is wooded.

Soil.—The soil is in general very good, especially in the lower portions of the

interior basin. The mountain coves also contain deep dark loam, which is very fertile. Some of the ridges, however, have a light shallow soil, owing to erosion of humus and loose earth.

Agriculture.—Twenty-four per cent of this basin is cleared land, most of which is grazed, although much of it is well adapted to diversified farming, which is unprofitable now because of the distance from market. A great drawback to agriculture is the cutting away of uncovered hill fields by the dashing rains and the deposition of the eroded material on other fields in the bottoms.

Floods.—The floods of the Nolichucky are notorious. They may be partly due to the topographic configuration of the area, by reason of which a rise of the three main tributaries at one time may cause a flood in the river. There is no room for doubt, however, that the large amount of cleared land in this basin greatly increases the floods. Every resident who has known the river ten years or more states very positively that the volume of water is now much less constant than in former years. In Yancey County many of the steep slopes in the basins of Caney River, Bald Creek, and in the vicinity of Burnsville, which have for many successive years been planted in corn or small grain, are deeply eroded, and some such fields have been abandoned. The same statement will apply to much steep land in Mitchell County, on the waters of Cane and Big Rock creeks, and in the vicinity of Red Hill. The lands at higher elevations, which have been retained in grass, are less damaged.

The alluvial lands of the Nolichucky were severely washed by several freshets during the spring and summer of 1901, the most severe being that of May 20 to May 23, which caused damage to land and other property in Mitchell County to the amount of $200,000 or more. All of the soil on the flood plain of Cane Creek, 9 miles in length, was removed, leaving only the large stones and rock, and many fine farms on North Toe River were destroyed. More than twenty dwellings, several mills and dams, and many million feet of sawlogs are known to have been washed away. In addition, the damage to the public highways was $50 or more per mile, aggregating $50,000, while the railroad sustained an equal loss in the injury to roadbed, bridges, and culverts, making the total loss in one season by erosion at least $300,000 in Mitchell County alone.

The forest.—Although greatly broken by clearings, large areas of woodland remain on the Unicoi and parallel ranges, on the northwestern border, on Roan Mountain, the Blue Ridge, the Black Mountain group, and the western tributaries of Caney River. The basin contains 1,553,340 M feet B. M. of log timber and 7,100,360 cords of small wood.

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In composition there is great variety. Spruce and balsam prevail on the highest portions of the Black, Roan, and Sampson mountain groups. Hemlock, birch, maple, cucumber, ash, buckeye, linn, and other moisture-loving trees line the ravines, while oak, chestnut, gum, and other hard woods cover the ridges of the higher altitudes. Oak and pine form a less dense cover, usually very brushy, on the ridges of lower altitudes. The proportions of species are as follows:

Proportions of species in Nolichucky River basin.

	Per cent.
Oaks	40
Hemlock	5
Ash	1
Linn	3
Birch	3
Locust	1
Chestnut	23
Spruce	1
Cucumber	1
Black gum	1
Maple	3
Black pine	1
Poplar	1
Other species	8
White pine	3
Buckeye	2
Beech	1
Hickory	2

In forest condition there is also great variety, dependent largely upon the prevalence of fire. Fires are freely set during autumn, winter, and spring, and great injury to timber, forest seedlings, and soil results. A large proportion of the timber trees are defective and much of the woodland area is imperfectly stocked.

The reproduction of trees is remarkably vigorous on cuttings, burns, and old fields, and growth is rapid. The prevention of fire and the application of improvement cuttings would wonderfully increase the value of the forest, which is the great natural resource of the mountainous portion of this basin.

CHEROKEE AND BUFFALO MOUNTAIN DISTRICTS (WASHINGTON AND UNICOI COUNTIES, TENN.).

Boundaries.—On the north, the north foot of Cherokee Mountains; on the east, the Watauga-Nolichucky divide; on the south, the South and Western Railway; and on the west, Nolichucky River.

Area.—Total, 24 square miles; cleared, 4 square miles; wooded, 20 square miles.

Surface.—Mountainous.

Soil.—On the ridges the soil is derived from gneiss and is light and dry; in the valleys it is derived from limestone and wash from the mountains and is fertile red clay and alluvium.

Humus and litter.—Light; consumed by repeated fires.

Agricultural value.—Only the valley land is of value. About 3 square miles are adapted to permanent agriculture.

Timber trees.—Black pine, 5 per cent; white oak, 20 per cent; chestnut oak, 5 per cent; scarlet oak, 3 per cent; black oak, 5 per cent; red oak, 1 per cent; chestnut, 10 per cent; poplar, 1 per cent; black gum, 2 per cent; locust, 1 per cent; hickory, 2 per cent; sugar maple, 1 per cent; post oak, 1 per cent; beech, 1 per cent; white pine, 5 per cent; hemlock, 5 per cent; scrub pine, 2 per cent; black cherry, sourwood, white ash, persimmon, red cedar, walnut, red maple, birch, linn, cucumber, and others, 30 per cent.

Yield.—Log timber, 19,520 M feet B. M.; small wood, 209,280 cords.

Demand.—Eight dollars per thousand feet is paid for best logs at mill, and $2 to $4 per thousand feet on the stump.

Accessibility.—The rolling lowlands and the steep mountain slopes render access difficult. A railroad is in operation on two sides of the tract.

Second growth.—The stand of saplings is deficient, owing to prevalence of fire.

Undergrowth.—Light; too thoroughly burned and grazed.

Reproduction.—Naturally free, but kept down by fire and grazing.

Rate of growth.—Rapid.

Water power.—Brooks of limited power are now used by saw and grist mills in the valleys.

Ownership.—A portion of the area is divided into small tracts held by residents.

Occupancy.—Only 3 or 4 families live on the tract.

Prices of land.—Mountain lands are worth from $2 to $4 per acre; farm lands, from $10 to $30 per acre.

LIMESTONE COVE DISTRICT (UNICOI COUNTY, TENN.).

Boundaries.—On the north, the South and Western Railway; on the east, the Watauga-Nolichucky divide; on the south, the State line; and on the west, the divide west of Limestone Cove.

Area.—Total, 36 square miles; cleared, 6.5 square miles; wooded, 29.5 square miles.

Surface.—Mountainous, excepting the lowlands, which are rolling to hilly, with narrow creek bottoms.

Soil.—On the mountains, derived from gneiss, of good physical quality, and when not burned nor washed, fertile; in the valleys, red clay loam, derived from limestone mixed with alluvium.

Humus and litter.—Light, owing to frequent fires, except in north coves.

Agricultural value.—The mountain slopes are too steep, rocky, and dry. About 5 square miles of the lowland are well adapted to mixed farming.

Timber trees.—Same as in Cherokee Mountains.

Yield.—Log timber, 29,200 M feet B. M.; small wood, 321,600 cords.

Demand.—Best log timber brings $2 per thousand feet on the stump. Sawed lumber averages about $18 per thousand feet on the railroad.

Accessibility.—A railway is in operation on the northern border and a tramway leads to Limestone Cove. The slopes are steep and rough in the southern portions of this tract. There is much brush on the north slopes.

Fire.—Light fires are frequent in winter and spring.

Second growth.—Saplings are abundant, except on the driest ridges and south slopes, where most severely burned and closely pastured.

Undergrowth.—Generally light, consisting of laurel, azalea, huckleberry, and the sprouts and seedlings of trees.

Reproduction.—Oak and white pine seedlings are most abundant. The forest would reproduce freely, were it not for the fires.

Rate of growth.—Under the present custom of burning and grazing the rate of growth is medium; otherwise it would be rapid.

Water power.—Limited and inconstant.

Occupancy.—The foothills and lower valleys are occupied by farmers, who have clearings also on some of the slopes and in some of the mountain coves.

Prices of land.—A common price for mountain land is $2 per acre. The hill farms bring $10, sometimes more, per acre. The best farm land is worth $30 per acre.

ERWIN DISTRICT (UNICOI COUNTY, TENN.).

Boundaries.—On the north, the South and Western Railway; on the east, the Limestone Cove divide; on the south, the State line; and on the west, Nolichucky River.

Area.—Total, 25 square miles; cleared, 4 square miles; wooded, 21 square miles.

Surface.—The lowland, 3 square miles, is undulating to hilly; the remainder is mountainous.

Soil.—The soil of the lowlands is red clay loam, derived from limestone and alluvial wash; in the mountains it is lighter colored and more porous, but in general it is fertile.

Agricultural value.—About 3 square miles are adapted to farming, but most of this is liable to erosion.

Timber trees.—Oaks, 35 per cent; chestnut, 20 per cent; white pine, 8 per cent; hemlock, 6 per cent; linn, 5 per cent; buckeye, 5 per cent; other species, 21 per cent.

Yield.—Log timber, 18,816 M feet B. M.; small wood, 211,200 cords.

Demand.—The best of the remaining log timber brings from $1 to $4 per thousand feet on the stump, according to accessibility.

Accessibility.—The South and Western Railway borders this track on the north and west, and wagon roads extend well into the mountains.

Fire.—Nearly 6,000 acres have been severely burned. Fires are very frequent.

Second growth.—Saplings are abundant near the farm lands, where fire is less common, but on the mountains there is not more than half a stand.

Undergrowth.—Dense laurel lines the ravines, and on the upper slope there are many sprouts and seedlings among huckleberry, azalea, and other brush.

Reproduction.—Free, except where fire has killed the seedlings. White pine is very promising.

Rate of growth.—Rapid.

Water power.—Abundant on Nolichucky River, but hard to control.

Occupancy.—About 60 families are living on this tract.

Prices of land.—Mountain land brings from 50 cents to $2 per acre; farm land, from $10 to $50 per acre.

NORTH BALD CREEK BASIN (MITCHELL COUNTY, N. C.).

Area.—Total, 16 square miles; cleared, 3.5 square miles; wooded, 12.5 square miles.

Surface.—The creek bottom is narrow and interrupted, the foothills are steep, and the mountain sides are rocky and often precipitous.

Soil.—Dark, fertile loam.

Agricultural value.—Most of the cleared lands yielded good crops of corn and grain at first, but are now in very poor condition, and hardly worth cultivating, except the alluvial portions. There are not over 500 acres of good farm land in the valley.

Timber trees.—Chestnut, 20 per cent; white oak, 10 per cent; linn, 5 per cent; red oak, 5 per cent; sugar maple, 3 per cent; gum, 3 per cent; ash, 2 per cent;

poplar, 1 per cent; chestnut oak, 5 per cent; cucumber, 3 per cent; black oak, 3 per cent; beech, 2 per cent; hemlock, 6 per cent; white pine, 2 per cent; other species, 30 per cent.

Yield.—Log timber, 30,308 M feet B. M.; small wood, 160,720 cords.

Demand.—Log timber has been sold by the tree at from 50 cents to $1.50 each, but 40 of the best trees have been sold at $6 each.

Accessibility.—Although the mouth of this creek is but 8 miles from the railroad, the wagon road is so rough and so often impassable that this basin is very difficult of access. The slopes also are rough, brushy, steep, and rocky, making logging operations expensive.

Fire.—Occasionally fires have run over the higher ridges, but the damage has been less than usual, very few large trees having been killed; the forest, however, is not in as good condition as it would be if the fires had been prevented.

Second growth.—Saplings are abundant and a large proportion of them are of valuable species.

Undergrowth.—There is much laurel along the ravines and northern slopes; other brush is abundant except on the ridges.

Rate of growth.—Rapid.

Water power.—Caney River at the north of this creek would furnish abundant power for large factories, but Bald Creek is small and inconstant, though there is very favorable ground for holding water near its mouth.

Occupancy.—About 35 families are living in this basin.

Prices of land.—Mountain land is worth from 50 cents to $3 per acre; farm land, from $5 to $20.

JACKS CREEK DISTRICT (MITCHELL COUNTY, N. C.).

Boundaries.—On the north, Toe River; on the east, the summit of Green Mountain; on the south Little Crabtree divide; on the west, Caney River divide.

Area.—Total, 28 square miles; cleared, 16 square miles; wooded, 12 square miles.

Surface.—Rolling to hilly, with very narrow and interrupted creek bottoms.

Soil.—Red clay loam, with small areas of alluvial land along the creeks and river.

Agricultural value.—Under corn and grass this land has been very productive, but is now in poor condition, much of it being worn out and eroded. About [illegible] square miles are adapted to permanent agriculture.

Timber trees.—Oaks, 35 per cent; chestnut, 20 per cent; [illegible] per cent; hemlock, 5 per cent; gum, 3 per cent; other species, 20 per cent. The timbered tracts are small and severely culled.

DAMAGES FROM FOREST FIRES IN SOUTHERN APPALACHIANS.

Yield.—Log timber, 18,816 M feet B. M.; small wood, 376,320 cords.

Demand.—The price has advanced since the railroad reached Huntdale. In the lower portion of the valley, linn, cucumber, sugar maple, and oak of good quality and above 16 inches in diameter bring $1 per tree.

Accessibility.—The longest haul is 10 miles, over inferior wagon roads, to Huntdale. The slopes are moderate, and logging operations are not especially difficult.

Fire.—Fires are not prevalent, though small burns are common. The clearings limit them to small areas.

Second growth.—Saplings are abundant on many of the wood lots, and they are usually of oak, chestnut, and other valuable species.

Undergrowth.—There is much laurel along the ravines; elsewhere there is a great variety in the density of underbrush, according to the various conditions of grazing, burning, stand of trees and saplings.

Reproduction.—Free. Valuable species reappear quickly after cutting.

Rate of growth.—Rapid.

Water power.—Abundant on Toe River, but elsewhere of little value.

Ownership.—This land is in small holdings, owned by resident farmers.

Occupancy.—About 150 families are living in this basin.

Prices of land.—From $5 to $30 per acre.

CANEY RIVER DISTRICT (YANCEY COUNTY, N. C.).

Boundaries.—On the north, Nolichucky River; on the east, Jacks Creek divide; on the south, Bald Creek divide; on the west, the crest of Sampson Mountain.

Area.—Total, 24 square miles; cleared, 2.25 square miles; wooded, 21.75 square miles.

Surface.—Excepting about 1 square mile of alluvial land, the surface is hilly to mountainous and cut by deep ravines.

Soil.—The soil is derived from gneiss, schists, and limestone, and is generally fertile, but the steepness of the slopes renders it very liable to erosion.

Agricultural value.—Corn sometimes yields 50 bushels per acre, grass also yields very well on new lands, but cultivation is difficult because of the steepness of the slopes.

Timber trees.—White oak, 15 per cent; red oak, 7 per cent; chestnut oak, 3 per cent; chestnut, 18 per cent; gum, 4 per cent; cucumber, 3 per cent; buckeye, 3 per cent; maple, 5 per cent; hemlock, 7 per cent; white pine, 2 per cent; linn, 4 per cent; other species, 29 per cent.

Yield.—Log timber, 53,630 M feet B. M.; small wood, 278,800 cords.

Demand.—Some of the choicest oak and poplar has sold for $1.50 per thousand

feet on the stump. Fifty cents per tree has been considered a good price, each tree averaging over a thousand feet.

Accessibility.—All this tract is within 12 miles of the railroad, but the slopes are steep and rocky and the numerous fords render the miserable wagon roads often impassable when water is high.

Fire.—In general the fires have been light, but frequent. Owing to them the ridges are very lightly timbered, except by pine.

Second growth.—Occasionally tracts are found where saplings are abundant, but these are exceptional because of fire and grazing.

Undergrowth.—Varied according to exposure to fire and grazing. In general there is dense laurel in the ravines, and a light sprinkling of sprouts, seedlings, and shrubs on the ridges.

Reproduction.—This land is especially valuable for its oak, white pine, and hemlock. Were it not for fire and grazing the land once cut over would be quickly restocked with the same species.

Rate of growth.—Rapid, except on ridges where dry.

Water power.—Abundant on Caney and Nolichucky rivers, but hard to control.

Occupancy.—About 20 families are living on this tract.

Prices of land.—Some of this land is worthless; 50 cents to $2 an acre probably covers the range of price for mountain land. Farm land brings from $5 to $20 per acre.

SPIVE CREEK DISTRICT (UNICOI COUNTY, TENN.).

Boundaries.—On the north, the Granny Creek divide; on the east, the crest of Sampson Mountain; on the south, the Higgins Creek divide; and on the west, South Indian Creek.

Area.—Total, 19 square miles; cleared, 3.32 square miles; wooded, 15.68 square miles.

Surface.—Hilly to mountainous.

Soil.—Light loam, in general much eroded.

Agricultural value.—The surface is steep and liable to erosion, but grass does well on new lands and on the gentler slopes.

Timber trees.—White pine, 25 per cent; white oak, 15 per cent; red oak, 10 per cent; gum, 10 per cent; maple, 10 per cent; hemlock, 4 per cent; birch, 3 per cent; linn, 5 per cent; cucumber, 5 per cent; chestnut oak, 3 per cent; other species, 6 per cent.

Yield.—Log timber, 31,233 M feet B. M.; small wood, [illegible] cords.

Demand.—The best standing timber brings $2 per tree; the best logs, delivered at the mill, bring from $5 to $6 per thousand feet.

Accessibility.—The center of this tract is 14 miles, by a rough wagon road, from the railway. The slopes are steep, rocky, and difficult to log, and the roads are frequently rendered impassable by freshets.

Fire.—Fires have been frequent and severe, especially on the ridges forming the northern boundary of this tract, where the forest is reduced to scattered pines and an undergrowth of oak sprouts and huckleberry brush.

Second growth.—Deficient, except in the coves on the side of Sampson Mountain.

Undergrowth.—Much varied, according to prevalence of fire and grazing and to moisture. In the coves of Sampson Mountain are dense thickets of laurel covering large areas.

Reproduction.—On the divide between Spive and Granny creeks white pine would soon occupy the land were it not for the annual fires. Elsewhere the hard-wood growth is checked by fires and grazing. A large proportion of the seedlings are of valuable species.

Rate of growth.—Rapid, except on the driest ridges.

Water power.—Limited; Indian Creek is not large, and the flow is inconstant.

Occupancy.—About 50 families are living on this tract.

Prices of land.—The woodland brings from $1 to $5 per acre; the farm land, from $5 to $20.

ROCKY FORK DISTRICT (UNICOI COUNTY, TENN.).

Boundaries.—On the north, the county line; on the east, the Clear Branch divide and South Indian Creek; on the south, Flint Ridge; and on the west, the State line.

Area.—Total, 11 square miles; cleared, 0.25 square mile; wooded, 10.75 square miles.

Surface.—Mountainous; very steep and rocky.

Soil.—Light loam of medium fertility.

Agricultural value.—None; it is too steep and rocky for cultivation.

Timber trees.—White pine, 20 per cent; chestnut oak, 10 per cent; hemlock, 6 per cent; red oak, 5 per cent; gum, 6 per cent; maple, 5 per cent; linn, 5 per cent; birch, 10 per cent; ash, 3 per cent; cherry, 3 per cent; poplar, 3 per cent; white oak, 15 per cent; other species, 9 per cent.

Yield.—Log timber, 36,396 M feet B. M.; small wood, 176,300 cords.

Demand.—The common price for standing trees ranges from 50 cents to $2 each when more than 16 inches in diameter.

Accessibility.—The center of the tract is about 15 miles from rail, and the wagon road is rough and steep, with many fords which are often impassable. In this basin the slopes are steep, rocky, and brushy; very difficult for logging.

Fire.—Occasionally light fires occur, but little damage has been done to mature timber. On the ridges and southern exposures they keep the forest in very poor condition.

Second growth.—Saplings are abundant, except on the ridges and southern slopes.

Undergrowth.—Many of the ravines are lined with dense laurel thickets, but in general the brush is light.

Reproduction.—Free, except as affected by fire and grazing.

Water power.—Limited; the creek is not large, but is fairly constant and very rapid.

Occupancy.—Four families are living in this basin.

Prices of land.—From $2 to $5 per acre.

SOUTH INDIAN CREEK DISTRICT (UNICOI COUNTY, TENN.).

Boundaries.—On the north, the Rocky Fork divide; on the east, the Clear Branch divide; and on the south and west, the State line.

Area.—Total, 22 square miles; cleared, 7.10 square miles; wooded, 14.90 square miles.

Surface.—Hilly to mountainous.

Soil.—A light-colored loam, derived from gneiss and schist. The alluvial portions are very fertile.

Agricultural value.—About 1,000 acres, having a gentle slope, are well adapted to agriculture; the remainder, though generally fertile, has too steep a slope.

Timber trees.—Oaks, 50 per cent; gum, 10 per cent; maple, 10 per cent; linn, 10 per cent; chestnut, 10 per cent; other species, 10 per cent.

Yield.—Log timber, 32,432 M feet B. M.; small wood, 179,000 cords.

Demand.—The best log timber brings $2 per thousand feet on the stump and $5 to $6 per thousand feet at the mill.

Accessibility.—Wagon roads lead through each of the main valleys. They are very rough and when the creek is high are impassable. The center of the tract is about 18 miles from the railroad. The slopes are steep and brushy, and logging is difficult.

Fire.—The ridges and south slopes are frequently burned, and these portions are in poor condition. In the north coves the damage has been slight.

Second growth.—On the north slopes the stand of saplings is excellent, but on the ridges and south slopes it is deficient.

Undergrowth.—Laurel is abundant, especially on the slopes of Sampson Mountain; elsewhere the brush is generally light.

Reproduction.—Free.

Rate of growth.—Rapid.

Water power.—Limited.

Ownership.—Local.

Occupancy.—About 120 families are living in this basin, including the village of Flag Pond.

Prices of land.—From $5 to $30 per acre.

EMBREVILLE DISTRICT, TENN.

Boundaries.—From the road along the foot of the mountain to the crest of the north slope, between Embreville and Haysville Furnace, Green and Cocke counties, Tenn.

Area.—Total, 39 square miles; cleared, 11 square miles; wooded, 28 square miles; burned, 10 square miles.

Surface.—The surface is a steep, and in many places precipitous, slope to the west, indented with a few small hollows. Along the foot of the mountain are low, rough hills.

Soil.—In the foothills the soil is a yellow clay, largely intermixed with coarse sand and gravel, derived from slates. On the mountain slope it is very thin, sandy, or gravelly, and is derived from quartzite.

Humus and litter.—Repeated fires have destroyed the accumulated litter, except in a few of the deepest hollows.

Agricultural value.—The mountain slopes are absolutely valueless for agricultural purposes. The foothills are poor and in many places almost sterile. Corn is the staple crop, but the yield is light.

Timber trees.—Scrub pine, black pine, scarlet oak, chestnut oak, chestnut, and white pine form the forest on the mountain slope and the characteristic growth on the foothills. This forest has been badly burned and the greater part of the hard woods are stool shoots, and the same is true of much of the black pine. In the hollows there is some poplar, black oak, linn, birch, and ash, but the amount is insignificant.

Yield.—On the slopes the yield is less than 1,000 feet of merchantable timber per acre. In the hollows it is between 2,000 and 3,000 feet.

Demand.—Good timber, where accessible, brings from $1 to $3 per thousand feet on the stump.

Accessibility.—The foot of the mountain is within 3 to 8 miles of the river. which is large and quiet enough for rafting. A railroad is near one end of the mountain.

Cutting.—There are several small mills at present cutting hard woods and pine. The best and most accessible timber has already been cut.

Second growth.—Second growth consists largely of scrub pine, associated with black and white pines, and sourwood and chestnut sprouts. A great portion of the forest on the mountain is second growth of this character.

Undergrowth.—Sourwood forms the undergrowth to a large extent in badly burned woods; *Kalmia* is occasionally found.

Rate of growth.—Accretion is slow, except in favored localities.

Waterpower.—None of the streams are large enough to yield power suitable for commercial purposes.

Prices of land.—Farm land on the foothills is held at $5 to $10 per acre; $1 to $2 per acre is reported to be the price at which the mountain lands are held.

INDIAN CREEK DISTRICT (UNICOI COUNTY, TENN.).

Boundaries.—Only the lower part of Indian Creek, including the basins of Granny Lewis Creek, Higgins Creek, and Jake Creek, is here included.

Area.—Total, 50 square miles; cleared, 3.5 square miles; wooded, 46.5 square miles; severely burned, little.

Surface.—The topography near these streams is very rough. Nearly all of the surface is steep and rocky, except the flats which lie near the main stream of Indian Creek, from 1 to 4 miles above its mouth.

Soil.—The soils are coarse-grained, sandy loams, usually very rocky and generally shallow, derived from quartzites and slates.

Humus and litter.—Repeated fires have robbed the soil of much of the accumulated humus, except in damp hollows and on north slopes.

Agricultural value.—The soil is too thin and poor to have a high productive power, although over limited areas it is deeper and of better quality. The rounded summits of the mountains have generally much better soil than the slopes and hollows, and they have not been so badly washed. Both grass and apples do well. Small grain and corn, however, can not be raised as cheaply as on better lands.

Timber trees.—White pine, chestnut, scarlet oak, white oak, with smaller amounts of red oak, birch, maple, and poplar, in relative abundance, about in the order named, compose the forests. Some hemlock is still left in the more inaccessible hollows, though the greater part has already been cut for tan bark. The white pine is generally of good quality where it has not been cut. The most accessible has already been lumbered.

Yield.—The white pine will cut about 2,000 feet B. M. per acre. Much of it has been badly burned. The hard woods will cut about 500 feet B. M. per acre.

Demand.—There is a strong demand for good grades of white pine, poplar, linn, oak, chestnut and ash, which bring from $1 to $2 per thousand feet on the stump, according to quality and the ease with which they can be logged.

Accessibility.—The railroad crosses the mouth of the creek.

Cutting.—There are at present five mills cutting white pine and hard woods on this area. Several other mills have cut here in the last two or three years.

Second growth.—There are some thickets of white pine on cut-over pine lands, but the greater portion of the second growth in the cut-over woods is sourwood, chestnut, and white oak, whose seedlings are already growing in the partial shade of the white pine.

Undergrowth.—There is considerable undergrowth in most of the forests; in some places rhododendron and *Kalmia;* in burned woods it is chiefly sourwoods, huckleberry, and sprouts from the stumps of fire-killed trees.

Rate of growth.—The white pine grows at a fair rate, except at low elevations, where it is much more rapid.

Water power.—Although the fall in all the streams is very great, they are too small to yield more than a very limited power.

Ownership.—Residents own the greater part of the timber.

Prices of land.—Woodland brings from $1 to $10 per acre, according to its situation and the suitability of the soil for agricultural purposes after the timber is cut.

SOUTH TOE RIVER BASIN (MITCHELL AND YANCEY COUNTIES, N. C.).

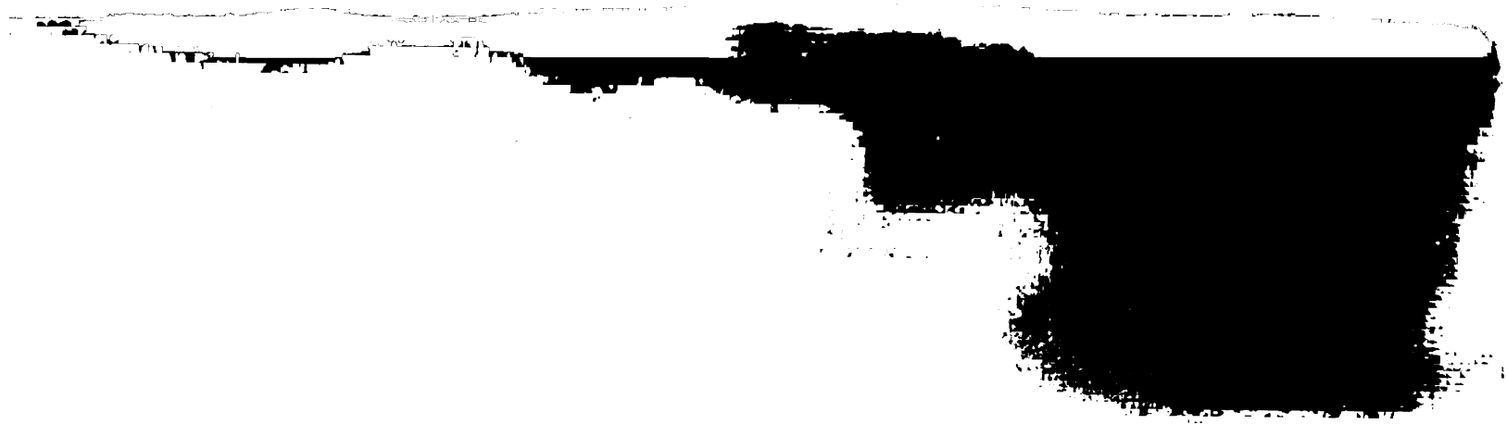
Area.—Total, 89 square miles; cleared, 18 square miles; wooded, 68 square miles; severely burned, 3 square miles.

Surface.—The upper portion of the basin is a deep north hollow lying between the Black Mountains and the Sevenmile Ridge. It is very rough and broken. The lower part opens out into a broader valley of low and generally steep hills, and near the head of Little Crabtree Creek there is some rolling uplands. The alluvial lands are not very extensive; they are distributed along both the main river and its chief tributaries.

Soils.—In the lower portion of the basin the soils are loams and loose loams, often very deep and fine-grained, derived from gneiss and mical and hornblende schists. In the upper part they are more sandy and are derived from gneiss and a coarse granite.

Humus and litter.—There is a deep accumulation of mold on north slopes and in the hollows, but less on drier southern slopes. A great part of the forest land on Sevenmile Ridge has been badly burned and the soil covering removed.

Agricultural value.—Some of the land in the lower part of the basin, especially that on Little Crabtree Creek, is of excellent quality, though inju-



Prices of land.—Farming land sells at $5 to $40 per acre; woodland, at $3 to $5.

HOLLOW POPLAR AND PIGEON ROOST CREEK BASINS (MITCHELL COUNTY, N. C.).

Area.—Total, 32 square miles; cleared, 3 square miles; wooded, 29 square miles; severely burned, 1 square mile.

Surface.—The surface is very rough. There are several small alluvial bottoms along the streams, but the greater part of the area is very hilly and much of it extremely mountainous and steep.

Soils.—The soils are loams, derived largely from gneiss or in part from quartzite. Though generally deep, they are too coarse grained to be very productive. In many cases they wash badly when cleared, unless carefully attended.

Humus and litter.—In nearly all the deep hollows at the heads of the streams is a considerable accumulation of leaf mold. On the lower hills and on the dry southern slopes this is often very scant, especially where it has been reduced by fire or by excessive pasturage, which has broken the forest cover.

Agricultural value.—The land, where it is not too steep or sandy, produces well. The staple crops are corn, grass, and apples, with some small grain.

Timber trees.—Oak and chestnut form the greater part of the forests. With these are associated linn, poplar, hemlock, ash, and locust. On some of the higher peaks and coldest exposures spruce occurs, and there is a small amount of white pine in the lower part of the basins of both streams. There has been some cutting, but a considerable part of the forest is yet unculled.

Yield.—The forest will cut from 2,000 to 3,000 feet B. M. per acre.

Demand.—There is active demand for first-class timber of nearly all kinds, especially for hard woods and white pine. The best stumpage brings $2 to $4 per thousand feet near the railroad. Inferior stumpage and that less conveniently situated commands less.

Accessibility.—A branch railroad from Johnson, Tenn., to Marion, N. C., crosses the mouth of both creeks, and there are fair wagon roads up both streams, which could easily be much improved to facilitate logging. Tramroads could be easily and cheaply constructed up both streams.

Second growth.—In the woodland adjoining the farms there is a large proportion of second growth. The greater portion of this consists of oak and chestnut sprouts, scantily intermixed with seedlings. There is some young white pine on the lower part of the streams.

Reproduction.—Reproduction is generally good. Pasturage has not been excessive. In some places, especially on the dry southern slopes of quartzite

ridges, fires have been frequent and have checked the development of young growth.

Rate of growth.—Accretion is normal for the elevation and aspect.

Water power.—These streams are too small to afford more than a very slight power.

Ownership.—The greater part of the land on both streams is controlled by a large company, though there are many small holdings near the mouths of the streams. There are about 50 families on both streams.

Prices of land.—Farming land sells at $6 to $20 per acre; woodland at $3 to $5.

CANEY RIVER BASIN ABOVE BURNSVILLE (YANCEY COUNTY, N. C.).

Area.—Total, 57 square miles; cleared, 10 square miles; wooded, 47 square miles; severely burned, 1 square mile.

Surface.—The basin is a deep valley lying between the Black Mountains and Yates Ridge and opening toward the north. At its lower part the valley broadens out, and there are low, rounded hills and some rolling land, but above the valley narrows, and the steep mountain slopes rise almost from the banks of the stream. There are small areas of level alluvial bottom bordering the stream at intervals, but they are not extensive. The entire mountainous portion is steep, and the greater part of it extremely rough and rocky, with a few bold cliffs.

Soil.—The soils in the lower part of the basin are deep and fine-grained loams, and loose loams, derived from schists. Above they are derived from gneiss. On the mountains they are shallow and are frequently sandy and coarse grained. In many places they are rocky, even on the bottoms.

Humus and litter.—Except on the burned land in the mountains and on some of the steepest and dryest slopes the leaf mold has generally accumulated to a great depth and forms a valuable soil covering on the steep slopes. In the spruce forests which cap the Black Mountains for nearly their entire length, there is an excellent growth of moss and similar vegetation.

Agricultural value.—Over limited areas, in spite of their steepness, the mountain slopes are very productive, especially in grass, which is the chief crop in this portion of the river basin. Corn is the staple grain. Only a small amount of wheat and oats is grown. The apples raised in this part of the valley are very fine. The alluvial bottom lands are not extensive, but are generally fertile, except in a few places, where they are sandy. Over limited areas they have been badly washed by freshets.

Timber trees.—The oaks form about 40 per cent of the forest; chestnut more than 30 per cent. Associated with these are maple, birch, ash, linn, buckeye, hickory, poplar, and hemlock. On the summits of all the higher peaks of the

Black Mountains there is a considerable amount of black spruce mixed with balsam, perhaps as much as 4,000 acres in all. The hard woods at the head of the river are largely birch, mixed with beech, maple, and buckeye, and there is a small amount of cherry.

Yield.—Below the mouth of Cattail Creek the best timber has been largely removed, although there is yet some very good oak uncut. Above this point, both on Cattail Creek and the main river, there has been less culling, and the stand will be from 3,000 to 5,000 feet B. M. per acre, except along the crests of the mountains and on steep, thin-soiled slopes. A few small areas in the spruce forest have been badly burned.

Demand.—There is a strong demand for best grades of lumber. Good timber brings from 50 cents to $1 per thousand feet standing.

Accessibility.—It is about 18 miles from the mouth of Cattail Creek, in the center of the basin, to the nearest railway station. The distance prohibits the transportation of any but the best lumber.

Cutting.—Many mills have cut on the stream at various times, and the best grades of timber have been removed as far up as a few miles above the mouth of Cattail Creek. At present there are only two mills cutting, but it is reported that others will shortly be erected.

Reproduction.—Reproduction is generally good.

Second growth.—Except on the lower part of the stream, which has long been settled up and where the farm woodland has been extensively culled, there is very little second growth. Oak and chestnut sprouts are the most important elements in the regrowth.

Undergrowth.—There are dense thickets of both laurel and *Kalmia* in a great part of the forest at the head of the river.

Rate of growth.—Accretion is about normal for the aspect and altitude.

Water power.—The stream is very rapid, and there are several sites where high dams could be built, which would afford small powers for manufacturing purposes.

Ownership.—The upper part of the basin is held in large tracts. The forest land in the lower part is in small holdings chiefly attached to the farms.

Prices of land.—Farming land sells at $10 to $150 an acre; woodland, at $2 to $5 an acre.

DOEBAG BRANCH DISTRICT (YANCEY COUNTY, N. C.).

Boundaries.—The area included is from the southern watershed of Doebag Branch to the western watershed of Brush Creek, and is limited on the north and east by Toe River.

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Area.—Total, 13 square miles; cleared, 6 square miles; wooded, 7 square miles; severely burned, very little.

Surface.—The Green Mountains penetrate the southwestern portion of the area, and from them numerous small streams descend into Toe River, dividing the area into a series of deep narrow hollows and alternating high ridges.

Soil.—Gray or red loams or loose loams, derived from gneiss and schists, are the prevailing soils. They are generally deep and fairly fine in texture and free from stones.

Humus and litter.—In the deep hollows, especially on the north side of the mountain, there is much leaf mold. The woodland is subject to pasturage, however, and this tends to prevent the accumulation of humus.

Agricultural value.—There are only a few narrow strips of alluvium. The upland soils are fairly productive, but on account of the steep slopes, unless carefully managed and kept in grass, are subject to wash. Corn, grass, small grains, and apples all do well.

Timber trees.—Chestnut, red oak, scarlet oak, and sourwood, with hickory and black gum, form the greater part of the forests, though the more typical mountain hard woods are found in the deep hollows around the mountain.

Yield.—The forests will cut from 2,000 to 3,000 feet B. M. per acre.

Demand.—There is considerable demand for shipping lumber of all hard woods.

Accessibility.—The lowest part of the area is 8 miles from the nearest railroad station. Wagon roads cross nearly every part of the area.

Cutting.—Considerable cutting has been done at different times, and the best part of the merchantable shipping timber has been removed.

Second growth.—The second growth is not very abundant and is confined to the woodland associated with the farms. It consists largely of scarlet oak, chestnut, and sourwood sprouts.

Undergrowth.—There is considerable brush in many places, generally *Kalmia*, with azalea and huckleberry. Where the woods are burned at irregular intervals there is often a dense undergrowth of stool sprouts from small trees and shrubs killed by the fires.

Reproduction.—Reproduction is generally good, both in cut and burned districts, unless the young trees are eaten down by cattle.

Rate of growth.—Accretion is normal for the elevation and aspect.

Water power.—The streams are too small to afford more than the smallest power.

Ownership.—There are about 20 families living in the area who own practically all the land. The woodland is divided into small holdings.

Prices of land.—Farming land sells at $5 to $30 per acre; woodland, at $2 to $5.

FRENCH BROAD RIVER BASIN ABOVE SKYLAND.

Topography.—French Broad River drains the Blue Ridge from Swannanoa Gap to Panther Tail Mountain (62 miles) and reaches entirely across the mountain region, which it leaves near the Tennessee line, after flowing across it for a distance of 80 miles. Around the borders of this basin are the Craggy Mountains, Swannanoa Mountains, and Estatoe, Panther Tail, Pizgah, and Max Patch peaks, all high and forest covered. In Madison County, where the river has cut through the northwestern rim of the plateau, is a large area of broken mountainous ridges, with very high and rocky slopes. A great portion of the interior basin, however, is smooth enough and fertile enough for grazing or farming. The basin has an area of 555,840 acres, of which 51 per cent is forested.

Soil.—The soil is extremely variable, though in general very good. That of the lower hills is a red clay, a fine sedimentary deposit. It is fertile and recuperates readily, but erodes rapidly when uncovered. The ridge land, as usual, is well adapted to grass, but if closely pastured erodes rapidly and soon becomes worthless. The best soil is found in the coves and on the broad alluvial bottoms which border the river and its larger tributaries from the Blue Ridge in the southeast to the head of the gorge near Marshall.

Agriculture.—Substantially all the lowland is occupied by farmers, and much of the basin is very productive and well adapted to mixed farming. This is, in fact, one of the best agricultural valleys to be found in the East. The principal difficulties to be met are erosion of surface soil on the hills and destructive floods on the bottoms. Much of the mountain region is also under cultivation. The cove lands are mostly cleared, and cleared mountain-side pastures dot the landscape.

Tobacco growing on the lighter soils of the hills exhausted field after field, and finally the whole industry was abandoned, leaving large areas of desolate land exposed to the cutting action of water. The same process has been in operation on old farm land and pastures until on many small tracts, as on the southern slopes of Poverty Hollow, near Barnardsville, there is but little soil left. There is hardly a farm in the entire basin that is not more or less gullied, although much care is taken by a few of the more thoughtful farmers to keep the earth covered by a vigorous crop. The inundations of the bottom lands also cause serious damage, and the general testimony is that they increase as more land is cleared.

The forest.—The higher mountains are still forested, and the ridges and slopes above 3,000 feet are mostly covered, although some of the ridges, as Elk, Spring Creek, and New Found ridges, have on them large proportions of cleared land and the mountain sides are often dotted with clearings.

The basin contains 665,360 M feet B. M. of log timber and 4,316,240 cords of small wood.

The forest in this region is mixed; the oaks and chestnut predominate, with a sprinkle of white pine, hemlock, linn, gum, beech, birch, maple, and hickory, and many other species of less importance. The proportion of species is as follows:

Proportions of species in French Broad River basin.

	Per cent.
Oaks	45
Hemlock	4
Buckeye	1
Beech	1
Other species	6
Hickory	3
Shortleaf pine	1
Chestnut	20
Ash	1
Linn	2
Birch	3
Locust	1
White pine	2
Cucumber	1
Black gum	4
Maple	4
Black pine	1

Fires, grazing, and culling have greatly reduced the original quality of the forest. Bordering the farms are many fine stands of sapling second growth, but the remote mountains are full of defective trees and brush.

Sprouts and seedlings spring up readily. White pine, shortleaf pine, poplar, ash, walnut, and cherry all abound in the forests in the form of promising young trees, and sumac and locust here reproduce rapidly and are well adapted to prevent erosion on the old fields.

PUNCHEON FORK DISTRICT (MADISON COUNTY, N. C.)

Boundaries.—On the north, the Tennessee State line; on the east, the eastern divide of Puncheon Fork; on the south, Laurel Creek; on the west, Ramsay R[illegible]

Area.—Total, 7 square miles; cleared, 0.75 square mile; wooded, [illegible] square miles.

Surface.—Hilly to mountainous.

Soil.—Brown loam. Fertile.

Agricultural value.—Two thousand acres are well adapted to farming.

Timber trees.—White oak, 10 per cent; chestnut oak, 5 per cent; red oak, 3 per cent; black oak, 5 per cent; chestnut, 15 per cent; gum, 5 per cent; maple, 10 per cent; ash, 3 per cent; cherry, 3 per cent; cucumber, 10 per cent; buckeye, 8 per cent; poplar, 5 per cent; hickory, 4 per cent; other species, 14 per cent.

Yield.—Log timber, 16,680 M feet B. M.; small wood, 80,000 cords.

Demand.—The best timber brings $2 per thousand feet on the stump.

Accessibility.—The nearest railroad is Marshall, about 20 miles, by a rough and hilly wagon road, from the center of the tract. The slopes are moderate and brush is abundant.

Fire.—Fires are frequent, but not severe.

Second growth.—Saplings are abundant and of valuable species.

Undergrowth.—Varied between dense laurel thickets along the streams and light stands of shrubs on the ridges.

Reproduction.—Free.

Rate of growth.—Rapid.

Water power.—Limited, but fairly constant. The creek, at its mouth, is rapid and usually about 25 feet wide and 1 foot deep.

Occupancy.—About 8 families are living in this basin.

Prices of land.—From $3 to $8 per acre.

LITTLE CREEK DISTRICT (MADISON COUNTY, N. C.).

Boundaries.—On the north, the Tennessee State line; on the east, Puncheon Fork divide; on the south, Laurel Creek; on the west, Roaring Fork divide.

Area.—Total, 5.50 square miles; cleared, 1.25 square miles; wooded, 4.25 square miles.

Surface.—Hilly to mountainous. The bottoms are very narrow and the slopes are steep.

Soil.—Yellow to brown loam.

Agricultural value.—The soil is very productive when new, but washes away quickly. About 300 acres are adapted to agriculture.

Timber trees.—White oak, 20 per cent; chestnut oak, 5 per cent; red oak, 15 per cent; black oak, 3 per cent; chestnut, 12 per cent; gum, 6 per cent; hard maple, 5 per cent; red maple, 3 per cent; hickory, 4 per cent; ash, 5 per cent; cherry, 1 per cent; other species, 21 per cent.

Yield.—Log timber, 11,400 M feet B. M.; small wood, 71,200 cords.

Demand.—The best log timber brings $1 per thousand feet.

Accessibility.—The center of this tract is about 20 miles, by a rough and hilly wagon road, from Marshall, the nearest railroad point.

Fire.—Fires have been light, but frequent, consuming humus and retarding undergrowth.

Second growth.—Most of the land affords a fair stand of saplings of valuable species.

Undergrowth.—This tract is not very bushy except along the streams, where laurel thickets abound.

Reproduction.—Naturally free, but retarded by fire.

Rate of growth. Rapid.

Water power.—The stream near its mouth is usually about 10 feet wide and 5 inches deep. Its fall is rapid.

Occupancy.—About 15 families are living in this basin.

Prices of land.—From $2 to $10 per acre.

FOSTER CREEK AND ROARING FORK DISTRICTS (MADISON COUNTY, N. C.).

Boundaries.—On the north, the Tennessee State line; on the east, Little Creek divide; on the south, Laurel Creek; on the west, the Spillcorn divide.

Area.—Total, 14 square miles; cleared, 3.25 square miles; wooded, 10.75 square miles.

Surface.—The creeks have very narrow bottoms of alluvial land; the remaining surface is hilly to mountainous, usually very steep.

Soil.—Loam, yellow to brown in color and very productive when newly cleared.

Agricultural value.—Well adapted to grass, except for the steepness of the slopes. About 1,000 acres are adapted to agriculture.

Timber trees.—White oak, 10 per cent; chestnut oak, 5 per cent; red oak, 5 per cent; black oak, 3 per cent; chestnut, 12 per cent; gum, 4 per cent; maple, 8 per cent; poplar, 2 per cent; hickory, 5 per cent; ash, 5 per cent; hemlock, 5 per cent; other species, 36 per cent.

Yield.—Log timber, 20,844 M feet B. M.; small wood, 50,500 cords.

Demand.—The usual price is $1 per thousand feet on the stump.

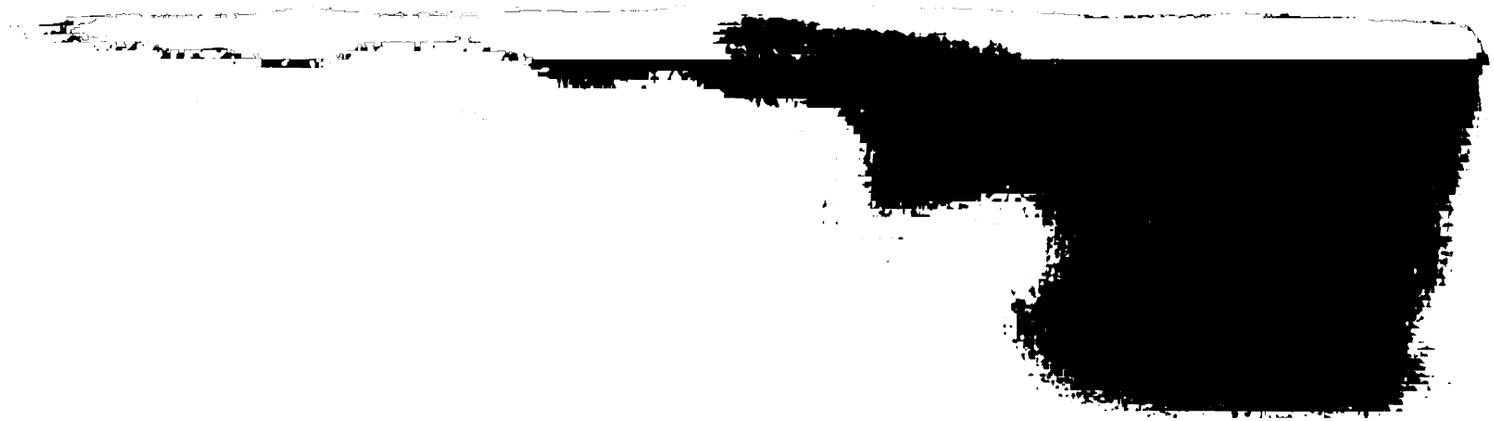
Accessibility.—The center of this tract is about 20 miles, by a rough and hilly wagon road, from rail.

Fire.—Fires have been frequent, though usually not severe. The larger trees have been only slightly injured, but many seedlings and small saplings have been killed.

Second growth.—While not of the best, the stand of saplings is very good, except along the crests of the ridges.

A. SAWING LARGE TIMBER AT SMALL MILL IN THE MOUNTAIN FOREST.

B BINDING POPLAR LUMBER FOR EXPORT, GREAT SMOKY MOUNTAINS, TENNESSEE.



Undergrowth.—Brush is usually light except along the ravines, where laurel abounds.

Reproduction.—Free, except as the seedlings are killed by fire.

Rate of growth.—Rapid.

Water power.—In Laurel Creek there is enough water with abundant fall for mills of medium size, but on Foster Creek the flow is too inconstant.

Occupancy.—About 30 families are living on this tract.

Prices of land.—From $5 to $10 per acre.

SHELTON LAUREL CREEK DISTRICT (MADISON COUNTY, N. C.)

Boundaries.—On the north and east, the Tennessee State line; on the south, the Spillcorn divide; and on the west, Allen Stand divide.

Area.—Total, 38 square miles; cleared, 4.65 square miles; wooded, 33.35 square miles.

Surface.—There are about 600 acres of alluvial bottom land, which is nearly level. The remainder is hilly to mountainous.

Soil.—Fertile loam.

Agricultural value.—Corn and grass yield very well until the fields begin to wash. About 1,500 acres are well adapted to farming.

Timber trees.—White pine, 30 per cent; hemlock, 5 per cent; white oak, 10 per cent; red oak, 5 per cent; chestnut, 5 per cent; gum, 5 per cent; maple, 5 per cent.; linn, 6 per cent; cucumber, 4 per cent; other species, 25 per cent.

Yield.—Log timber, 67,304 M feet B. M.; small wood, 320,000 cords.

Demand.—The best log timber brings from $1 to $2 per thousand feet on the stump.

Accessibility.—This land is not difficult to log, but it is nearly 20 miles from rail, by a rough and hilly wagon road which is often impassable.

Fire.—Fires are very frequent, especially on the ridges in the northern part, where large amounts of timber have been killed and the forest is reduced to scattered survivors and sprouts of oak, chestnut, and maple.

Second growth.—Very deficient, except on small areas near clearings. Elsewhere fires have been too severe.

Undergrowth.—Laurel is dense along the streams and in north coves. There is also much brush on the burned land.

Reproduction.—On much of the tract reproduction is prevented by the fires; but where protected valuable species are sometimes found in great abundance. White pine is the most promising species in this region.

Rate of growth.—Rapid.

Water power.—Limited. The lower portion of this stream would furnish enough power for factories of medium size, but the flow is somewhat inconstant, and seems to fluctuate the more as the burns and the clearings reduce the forest.

Occupancy.—About 70 families are living in this basin.

Prices of land.—Mountain lands are valued at $1 to $2 per acre; farm lands, at $5 to $20 per acre.

SPILLCORN CREEK DISTRICT (MADISON COUNTY, N. C.).

Boundaries.—On the north and west, Shelton Laurel divide; on the east, the State line and Foster Creek divide; on the south, Foster Creek divide and Big Laurel Creek.

Area.—Total, 14 square miles; cleared, 5.25 square miles; wooded, 8.75 square miles.

Surface.—Hilly to mountainous.

Soil.—Yellow to brown loam; very fertile when first cleared.

Agricultural value.—About 1,200 acres of this land are well adapted to agriculture, but the remainder is too steep and liable to wash, though much of it produces good crops of grass several years after clearing.

Timber trees.—White pine, 8 per cent; hemlock, 5 per cent; white oak, 10 per cent; chestnut oak, 5 per cent; red oak, 3 per cent; black oak, 4 per cent; chestnut, 12 per cent; gum, 4 per cent; maple, 6 per cent; ash, 2 per cent; cherry, 2 per cent; cucumber, 7 per cent; buckeye, 8 per cent; poplar, 2 per cent; hickory, 5 per cent; other species, 17 per cent.

Yield.—Log timber, 20,705 M feet, B. M.; small wood, 67,220 cords.

Demand.—The best of the log timber brings from $1 to $2 per thousand feet on the stump.

Accessibility.—The center of this tract is about 14 miles, by a rough wagon road, from the railroad. The wagon road now leading through this basin is very rough and becomes impassable with every rise of the stream. The slopes are steep and somewhat brushy, but not especially difficult to log.

Fire.—Fires are frequent along the ridges, where saplings and brush are frequently killed and the forest is kept in inferior condition. The lower slopes, however, have not been severely damaged by fire.

Second growth.—Abundant on all cuttings on north slopes where protected from fire.

Undergrowth.—Usually light.

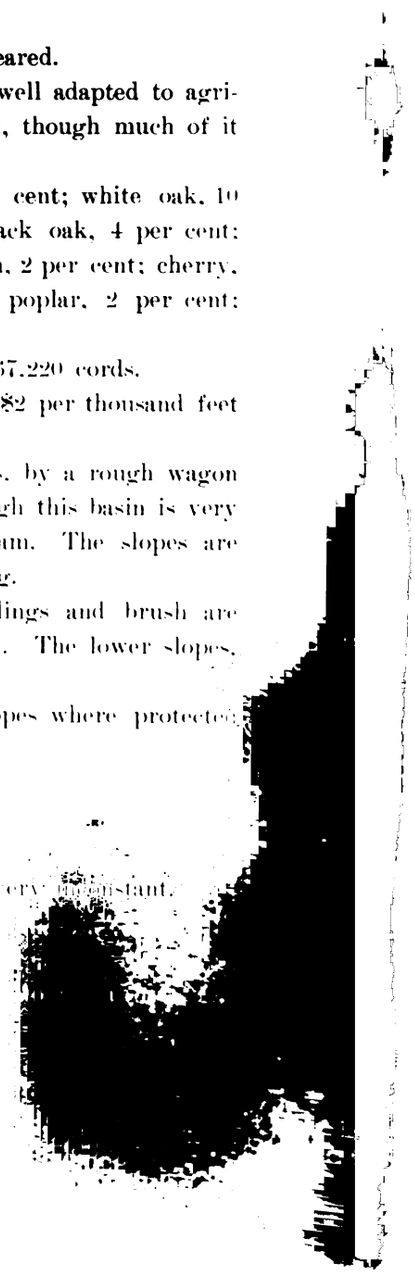
Reproduction.—Free, except for fire.

Rate of growth.—Rapid.

Water power.—Limited; the stream is not large and is very inconstant.

Occupancy.—About 40 families are living on this tract.

Prices of land.—From $2 to $15 per acre.



SPRING CREEK BASIN BELOW BLUFF (MADISON COUNTY, N. C.).

Area.—Total, 8.50 square miles; cleared, 1.25 square miles; wooded, 7.25 square miles.

Surface.—Mountainous; steep and rocky, excepting perhaps about 500 acres in the central portion.

Soil.—Light loam.

Agricultural value.—About 500 acres are adapted to farming.

Timber trees.—White pine, 25 per cent; black pine, 10 per cent; hemlock, 10 per cent; white oak, 8 per cent; scarlet oak, 6 per cent; black oak, 6 per cent; hickory, 6 per cent; other species, 29 per cent.

Yield.—Log timber, 10,400 M feet B. M.; small wood, 50,000 cords.

Demand.—The best log timber, which is pine and white oak, brings about $1 per thousand feet on the stump, where fairly accessible.

Accesibility.—A good wagon road leads through the valley to Hot Springs on the Southern Railway, which is about 8 miles from the remotest part of this tract.

Fire.—Fires are frequent and severe; almost the entire tract is overrun each year; many of the timber trees have been killed and the forest is reduced to scattered survivors with an underbrush of sprouts and shrubs, except in some of the hollows, in which there is a fair stand of timber trees.

Second growth.—Very inferior because of the fires.

Undergrowth.—Light; subdued by the fires.

Rate of growth.—Medium.

Reproduction.—Poor on account of fires.

Water power.—Excellent.

Occupancy.—About 10 families are living on this tract.

Prices of land.—From 50 cents to $5 per acre.

SPRING CREEK BASIN ABOVE BLUFF (MADISON COUNTY, N. C.).

Area.—Total, 41.50 square miles; cleared, 8 square miles; wooded, 33.50 square miles.

Surface.—The valley bottom, which is frequently half a mile wide, though occasionally interrupted, is undulating to rolling. The foothills and the mountain sides are usually steep, but some of the coves are level enough to be arable.

Soil.—Dark loam, usually fertile.

Agricultural value.—This valley is noted for its grass. About 3,500 acres are adapted to agriculture.

Timber trees.—Chestnut, 20 per cent; white oak, 12 per cent; red oak, 6 per

cent; chestnut oak, 6 per cent; hickory, 4 per cent; gum, 5 per cent; linn, 6 per cent; maple, 7 per cent; buckeye, 6 per cent; birch, 3 per cent; cucumber, 5 per cent; other species, 20 per cent.

Yield.—Log timber, 54,580 M feet B. M.; small wood, 420,280 cords.

Demand.—The best of the log timber brings from 50 cents to $3 per thousand feet on the stump.

Accessibility.—The remotest part of this tract is 20 miles from the railroad at Hot Springs. The wagon road below Bluff is good, but above that point it is rough and often impassable.

Fire.—The western ridges have been frequently burned and the forest on them has been considerably reduced. Elsewhere the fires are held in check by the clearings.

Second growth.—Except on the ridges, saplings are abundant and usually of valuable species.

Undergrowth.—Light.

Reproduction.—Free, except for fire.

Rate of growth.—Rapid.

Water power.—Near Bluff are many good sites for mills using a moderate amount of power.

Occupancy.—About 150 families live in this valley.

Prices of land.—Mountain land brings from $4 to $6 per acre; valley land, from $25 to $50.

BIG PINE CREEK DISTRICT (MADISON COUNTY, N. C.).

Boundaries.—On the north, Oak Branch divide and French Broad River; on the east and south, the Pawpaw and Little Pine divides; and on the west, Spring Creek divide.

Area.—Total, 17 square miles; cleared, 5.50 square miles; wooded, 11.50 square miles.

Surface.—Hilly to mountainous.

Soil.—Brown loam with many fragments of quartz, which resist wash.

Agricultural value.—About 2,000 acres are adapted to farming or grazing, although the surface is steep and much care is needed to prevent washing.

Timber trees.—Chestnut, 20 per cent; white oak, 12 per cent; red oak, 6 per cent; chestnut oak, 6 per cent; hickory, 4 per cent; gum, 5 per cent; cucumber, 5 per cent; linn, 6 per cent; maple, 7 per cent; buckeye, 6 per cent; birch, 3 per cent; other species, 20 per cent.

Yield.—Log timber, 12,491 M feet B. M.; small wood, 96,000 cords.

Demand.—The best timber brings $2 per thousand feet on the stump.

Accessibility.—All of this tract is within 12 miles of the railroad. The slopes are steep and difficult for logging.

Fire.—Fires are frequent, but the forest is much protected by clearings and the fires could easily be prevented.

Second growth.—There is a medium stand of saplings on most of the tract.

Undergrowth.—There is a moderate amount of brush, composed of shrubs and seedlings, but not enough to be a serious obstruction in logging.

Reproduction.—Free, except for fire.

Rate of growth.—Medium.

Water power.—Limited, except at the mouth of the creek, where there is an abundance, and on French Broad River.

Ownership.—Local.

Occupancy.—About 50 families are living in this basin.

Prices of land.—From $5 to $20 per acre.

PAWPAW AND LITTLE PINE CREEK DISTRICTS (MADISON COUNTY, N. C.).

Boundaries.—On the north and west, the Big Pine divide; on the east, French Broad River; on the south, the Sandymush divide.

Area.—Total, 26 square miles; cleared, 15.25 square miles; wooded, 10.75 square miles.

Surface.—Hilly to mountainous.

Soil.—Brown loam; fertile.

Agricultural value.—Good crops of corn and grass are secured when the land is new. Several good fields of clover were seen. About 6,000 acres of this land are adapted to agriculture.

Timber trees.—White oak, 15 per cent; chestnut oak, 4 per cent; red oak, 4 per cent; black oak, 6 per cent; Spanish oak, 2 per cent; chestnut, 15 per cent; white pine, 1 per cent; hemlock, 1 per cent; linn, 6 per cent; maple, 2 per cent; buckeye, 6 per cent; gum, 12 per cent; other species, 26 per cent.

Demand.—The best log timber brings from $1 to $2 per thousand feet on the stump.

Accessibility.—All of this tract lies within 10 miles of the railroad. The wagon road is inferior, and the remaining woodland is high on the mountain side and somewhat difficult of access.

Fire.—Limited. The large area of cleared land forms a protection against fires.

Second growth.—There are several small tracts in this basin which have a good stand of saplings, but in general the stand is deficient.

Undergrowth.—Light.

Rate of growth.—Medium.

Water power.—Limited.

Occupancy.—About 100 families are living on this tract.

Prices of land.—From $2 to $25 per acre.

SANDYMUSH CREEK DISTRICT (MADISON AND BUNCOMBE COUNTIES, N. C.).

Boundaries.—On the north, Spring Creek and Little Pine Creek divides; on the east and south, French Broad River and the Turkey Creek divide; on the west, Haywood County line and Spring Creek divide.

Area.—Total, 49 square miles; cleared, 25 square miles; wooded, 24 square miles.

Surface.—Except the creek bottoms, comprising about 3,000 acres, this tract is hilly to mountainous.

Soil.—Brown loam, which is in general very fertile.

Agricultural value.—About 10,000 acres are adapted to agriculture, yielding good crops of grass and grain.

Timber trees.—White oak, 15 per cent; chestnut oak, 4 per cent; red oak, 4 per cent; black oak, 6 per cent; Spanish oak, 2 per cent; chestnut, 15 per cent; white pine, 1 per cent; hemlock, 1 per cent; linn, 6 per cent; maple, 2 per cent; buckeye, 6 per cent; gum, 12 per cent; cucumber, 5 per cent; other species, 21 per cent.

Yield.—Log timber, 24,742 M feet B. M.; small wood, 128,200 cords.

Demand.—The best log timber brings from $1 to $2 per thousand feet on the stump.

Accessibility.—This tract is all within 20 miles of the railroad and the slopes offer no special difficulty to logging.

Fire.—Limited; the woodlands are protected by the clearings.

Second growth.—There are many saplings, but most of them are inferior, having grown up under crooked and defective old trees.

Undergrowth.—Among the brush, which is usually quite dense, there are many seedlings of valuable trees.

Reproduction.—This land would soon be restocked with valuable species if fire were prevented. The old pastures are usually restocked with inferior species such as persimmon, hemlock, peawood, and sassafras.

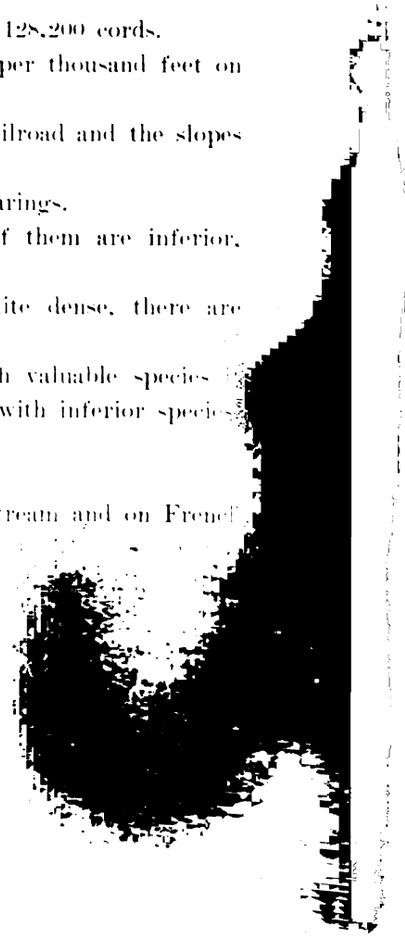
Rate of growth.—Medium.

Water power.—Abundant on the lower portion of the stream and on French Broad River.

Ownership.—Local.

Occupancy.—About 250 families live on this tract.

Prices of land.—From $2 to $50 per acre.



WOLF CREEK BASIN.

This stream flows northward from Butt Mountain, in which it has its source, into French Broad River. It is in many ways very similar to Laurel, Brush, and Paint creeks, which enter the river from the northern side, nearly opposite. The stream is very rapid, often cascading, and the basin is composed of narrow valleys, which are often constricted, especially near their mouths, but which widen out above and have generally rounded slopes and often small alluvial strips at their head.

The soil is rather sandy and is derived in large part from conglomerate, quartzite, and sandstone; less frequently, fine slates and gneiss. Gneiss and slates give rise to the more fertile soils, and where these are the country rocks the greatest erosion has taken place, and rounded hills or small open valleys have been formed. Wherever quartzite occurs steep ridges or bluffs are formed, and narrow chasm-like gorges result with a scant, light, often strong soil. The stream is crossed at its mouth by the Southern Railway, and offers excellent opportunities for logging and shipping. Wolf Creek can be splashed for a distance of 5 miles above its mouth. The timber has been very fine. On account of the accessibility, however, considerable logging has been done and the basin has been culled of the poplar, ash, oak, and linn which was situated a convenient distance for hauling from the main stream. A company is now operating on the creek under contract to cut all merchantable hard wood more than 12 inches in diameter and all merchantable white pine 6 inches or more in diameter. This company expects to cut within the next year 6,000,000 feet of pine and hard woods. The land on the creek is largely owned by the Tennessee Coal, Iron and Railroad Company. There is some hemlock on the stream, but no bark has been peeled.

Few of the farms are extensive. There is a considerable area of steep land at the head of the creek which could be placed in cultivation as soon as the timber has been cut and the land sold to settlers. Much of the woodland in which there is any pine has been burned and the timber to some extent damaged.

PAINT CREEK BASIN (MADISON COUNTY, N. C.).

Area.—Total, 11 square miles; cleared, 4.5 square miles; wooded, 6.5 square miles; severely burned, none.

Surface.—Nearly the entire basin is broken into steep hills or is mountainous. There is very little alluvial bottom land.

Soils.—The prevailing soil is sandy loam, derived from gneiss and mica schists. Though generally deep, it is too coarse grained and sandy to be very productive. In many cases it washes badly when cleared.

Humus and litter.—In the deep hollows at the head of the stream there is a considerable accumulation of leaf mold in the forest. On the lower hills and dry south slopes this is often altogether absent, on account of the brush fires and pasturage.

Agricultural value.—The land produces fairly well where it has not been cleared too long and is not steep enough to have washed badly. Small grain, corn, and dark tobaccos, with apples, are the chief crops. Apples, especially, do very well. Some grass is grown, but the southerly aspect and the poor, sandy soil are not well adapted to grass.

Timber trees.—Oaks and hickories, associated with the shortleaf and black pines, form the forest on the lower hills and dry southern slopes. Maples, birches, linn, and hemlock are associated with the oaks on the moister land, especially at higher elevations. The best of the lighter woods has been cut.

Yield.—The lower part of the valley will cut less than 2,000 feet B. M. per acre; the upper part will cut more.

Demand.—Several mills have at different times sawed lumber on this creek, so that the most accessible timber has been cut. Good timber is scarce and brings from $1 to $4 per thousand feet on the stump.

Accessibility.—The mouth of the creek is 12 miles, by a good wagon road, from Marshall, on the Southern Railway. There is a fair road up the creek to its head.

Second growth.—Around the older farms there is a considerable amount of second-growth woodland, both of sprouts and seedlings. The sprouts consist largely of scarlet and white oak, sourwood, and chestnut; the seedlings of small groves of shortleaf and black pines.

Undergrowth.—The woods are generally open, though in some places there are rhododendron thickets and underbrush sprouts, which have followed fires.

Reproduction.—Reproduction is generally good where there are no fires nor pasturage. Cattle are grazed in much of the woodland, which tends to check the regeneration of broadleaf species, and fires are frequent and severe.

Rate of growth.—Accretion is normal for the elevation and aspect.

Water power.—This stream is too small to afford more than a very small power.

Ownership.—The timber land is largely owned by residents. There are no very large tracts.

Occupancy.—There are about 37 families living in this basin.

Prices of land.—Farming land sells at $6 to $25 per acre; woodland, at $3 to $10.

A. SLIGHTLY CULLED MIXED FOREST, NEAR LINVILLE, N. C.

B. EXCESSIVELY CULLED WHITE-PINE FOREST, SHADY VALLEY, TENNESSEE.

Cutting.—Except at the heads of the streams the best timber has been cut.

Reproduction.—Reproduction is generally good. Young trees can be seen everywhere in the forest, where protected from cattle and fire.

Second growth.—Below Dunsmore a great portion of the forest is formed of second-growth timber in the woodland; chestnut, scarlet oak, black oak, and white oak form the dominant elements of the second growth.

Undergrowth.—There are several thickets of rhododendron and *Kalmia* in the deep hollows at the head of the basin.

Rate of growth.—Accretion is good, except at high elevations on thin, dry soils.

Water power.—The main stream and its tributaries are too small to afford a large power. Many mill sites are available, however, and several gristmills are utilizing a portion of the power.

Ownership.—The forest land in the lower part of the basin is in small holdings, generally less than 100 acres.

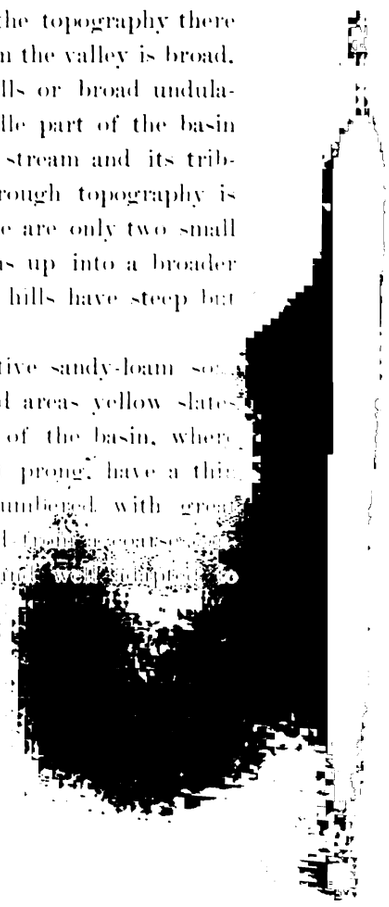
Prices of land.—Farming land sells at $10 to $100 per acre; woodland, at $5 to $20 per acre.

SHUT-IN CREEK BASIN (MADISON COUNTY, N. C.).

Area.—Total, 15 square miles; cleared, 4 square miles; wooded, 11 square miles; severely burned, 2 square miles.

Surface.—The river hills at the mouth of the creek make the topography there rough and broken. For 2 miles above the mouth of the stream the valley is broad, and the country slopes back toward the ridges in gentle hills or broad undulations. This portion of the valley is thickly settled. The middle part of the basin is formed of constricted, gorge-like valleys, where the main stream and its tributaries have cut through a great mass of quartzite. This rough topography is also found on the left fork of the stream to its head. There are only two small farms situated upon it. The basin of the right prong opens up into a broader valley under the slopes of Max Patch Mountain, where the hills have steep but generally fertile slopes.

Soil.—The lower part of the basin has a fairly productive sandy-loam soil derived largely from sandstones and gray slates. Over limited areas yellow slates prevail, yielding a more argillaceous soil. The middle part of the basin, where the valley is constricted between great ridges, and the left prong have a thin sandy soil, not fertile, and in many places gravelly or encumbered with great fragments of rock. On the right prong the soils are derived from coarse conglomerate and, though sandy, are deep, free from stones, and well adapted to tillage.



Humus and litter.—In the lower part of the basin, where the woodland is closely pastured and frequently burned, humus is scanty. Where the steep quartzite ridges occur fires destroy nearly all of the leaves each winter. The soil, however, in the forest at the headwaters, especially on the slope of the Max Patch Mountain, is protected by a deep accumulation of mold.

Agricultural value.—In the lower part of the basin corn and small grain are extensively grown. Many cabbages are raised for shipment. The soils are too sandy and the elevation too low to be well suited for grass. On the right prong hay and cattle are raised. Apples, oats, and rye do well.

Timber trees.—Black pine, white pine, chestnut, scarlet oak, hemlock, chestnut oak, and red oak form the dominant growth, except at the very head of the right fork, where typical hard-wood forests of oak, chestnut, maple, birch, ash, and poplar prevail.

Yield.—In the lower part of the basin is a stand of from 1,000 to 2,000 feet B. M. per acre, largely of white pine; in the upper part of the basin the stand is from 3,000 to 4,000 feet B. M. per acre, largely of chestnut and oak, with some poplar, ash, maple, and birch. In addition to the above there are about 20 cords of small wood per acre in the lower part of the basin and about 30 cords of small wood per acre on the right prong.

Demand.—White pine, good oak, ash, yellow poplar, and, if sound, chestnut, are in demand, and bring from $2 to $4 per thousand feet on the stump.

Accessibility.—The creek is crossed at its mouth by the Southern Railway, and its headwaters lie only about 9 miles, by road, from the nearest station. A good road extends 4 miles up the creek, and it could, with little cost, be improved beyond that point. Logging roads could easily be constructed to all the timber, except that on the quartzite ridges, where the steepness and rocks would present a difficulty.

Fire.—The woodland in the lower part of the basin, which is largely in wood lots connected with the farms, is seldom burned; the dry pine forests of the quartzite ridges suffer much from severe and frequent conflagrations, which have destroyed nearly all of the young growth, or reduced it to stool shoots, and injured the commercial value of the mature pine. But little damage has been done to the forest at the head of the stream.

Cutting.—There are no mills in operation on the creek at present. Nearly all of the best hard wood, however, has been removed from the lower part of the valley and the choicest has been culled to the very headwaters, except from a few bodies of restricted area. No tan bark has been cut.

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Reproduction.—All the species seem to seed regularly and reproduce freely under suitable conditions. This is especially true of the pines, the seedlings of which are abundant wherever they are protected from fire and suitable light conditions prevail. Chestnut and the oaks sprout freely from the stump, except in larger trees.

Second growth.—Where not suppressed by fire or cattle, there is an abundant undergrowth of young trees of the same species as those which form the dominant growth—pines and scarlet oak on south slopes, and birch, oaks, and maple on more shaded exposures.

Undergrowth.—In many places the undergrowth is dense, especially in hollows and on north slopes. It is usually composed of rhododendron, *Kalmia*, buckeye, and leucothoë.

Rate of growth.—Good growth is made where the soil is moist and deep. The growth of the oak in the lower part of the valley is fair on the uplands, and the trees do not attain a large size. Much better growth is made on the upper part of the stream. The growth of the pine is only fair.

Water power.—There is one gristmill in operation at present, about 3 miles above the mouth of the stream. Although there is ample fall, the power secured is slight.

Ownership.—The forest lands are largely owned by resident citizens. There are 18 families on the right fork, 2 on the left fork, and 13 below the forks.

Prices of land.—Cleared land in condition for farming is worth from $6 to $20 per acre; forest land, from $1 to $4 per acre.

MEADOW AND ROARING FORK BASINS (MADISON COUNTY, N. C.).

Area.—Total, 24 square miles; cleared, 5 square miles; wooded, 19 square miles; severely burned, 3 square miles.

Surface.—The surface of these basins is extremely rough and the slopes steep. There is very little bottom land along the streams and no level uplands. The north slopes, especially those of Hogback Mountain and Spring Creek Mountain, are so steep and rocky that they are not generally cultivated, but the south slopes are usually more gentle and are cleared to the headwaters of the streams. The soil is a gray loam, exceptionally red, and generally gravelly, largely derived from an altered conglomerate. On nearly all of the southern slopes where the inclination is not too steep, it is deep and fairly productive. It is occasionally rocky, especially on the north slopes, where the rock is often exposed. This condition is largely due to the dip of the rock.

Humus and litter.—Mold is generally abundant, especially in the woods on north and northeast slopes. The soil is often [illegible]

abundant and their dry leaves have been burned. Where this is the case it is apt to be on a south slope and at a comparatively low elevation. Around many of the farms forest litter is removed for bedding for cattle and to improve the tilled soils.

Agriculture value.—The soils and altitude are especially suited to grass and apples. The small grains, tobacco, and corn do well at low elevations.

Timber trees.—Chestnut, chestnut oak, scarlet oak, white pine, red oak, white oak, yellow poplar, birch, linn, maple, and hemlock, with occasional ash and cherry, in relative abundance about in the order named, constitute the greater part of the forests. The timber has been badly culled to within 4 miles of the headwaters.

Yield.—White pine, which is found in commercial quantities only below Kline, will yield about 1,500 feet B. M. to the acre. There is very little merchantable timber of other species associated with the white pine. Above Kline, the poplar will yield about 500 feet B. M. per acre, and the rest of the timber, largely chestnut and oak, about 2,500 feet. Much of the timber is in wood lots attached to the farms. In addition to the above, there will be about 15 cords of wood to the acre below Kline, and from 20 to 30 cords to the acre above Kline.

Demand.—At present only poplar, ash, oak, and cherry are being cut. Three dollars per thousand feet on the stump is paid for the best timber of the above kinds, except for cherry, which commands $12.

Accessibility.—The upper part of these streams is about 16 miles from the Western North Carolina Railroad at Hot Springs. The wagon road is across a high ridge, which adds much to the cost of hauling. With some clearing out of rocks in the beds of the streams they can be splashed when at high water and logs driven into Spring Creek. Timber roads can be easily constructed to any body of timber in either basin. Where the conglomerate is near the surface, or the soil is gravelly, a good roadbed is assured.

Cutting.—Only one sawmill has cut on either stream. It has made four stands, cutting about 200,000 feet B. M. at each stand. On account of the distance, it is necessary to haul only the choicest. Yellow poplar, ash, oak, linn, and cherry have been cut. No pine has yet been marketed, though it has been badly culled for domestic use. The mill which is now in operation is a portable sawmill with capacity of about 10,000 feet per day. Much of the lumber has been marketed locally. The greater part for shipment is cut in one-inch boards and transported by wagon to Hot Springs.

Fire.—Fires are of exceptional occurrence in the hard woods. They are most frequent on the southern spurs of Round, Max Patch, Hogback, and

Spring Creek mountains. In the pine woods they are of nearly annual occurrence, damage much standing timber, and destroy or kill back to stool shoots much young growth of fire-tender species.

Reproduction.—All the trees seed frequently and regularly, and under suitable conditions the seed germinate freely. Chestnut, linn, and the oaks sprout from the stump after cutting, unless the trees are of large size.

Second growth.—Above Kline there is excellent reproduction of birch, maple, hemlock, and chestnut in deep hollows and on north slopes; fair reproduction of chesnut, scarlet oak, white oak, and chestnut oak on drier and thinly soiled ridges. Below Kline, where the white pine is the dominant tree, the young growth is largely composed of white pine, scarlet oak, and white oak.

Undergrowth.—The woods are generally open, except for young trees. In places, however, there are dense thickets of rhododendron and *Kalmia*.

Rate of growth.—Good growth is made, especially on warm, southern slopes with a deep moist soil. The growth is slower toward the heads of streams; that of the white pine is above the average rate of accretion.

Water power.—There are several good sites for small mills, and there is rapid fall in the streams, but on account of their small size only limited power is available.

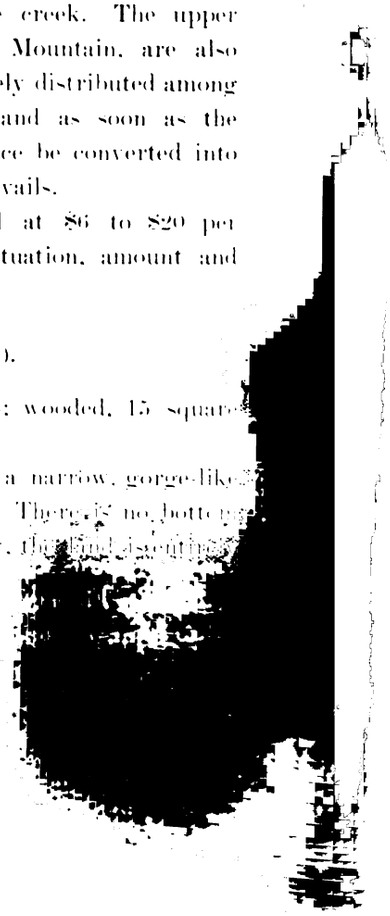
Ownership.—The timber lands of Meadow Fork are largely embraced in the Updegrove holdings, especially those at the head of the creek. The upper forests of Roaring Fork, on the slopes of Max Patch Mountain, are also embraced in these holdings. The rest of the timber is largely distributed among small landowners. These valleys are thickly settled up, and as soon as the timber is cut from the Updegrove lands they will at once be converted into farms to relieve the crowded condition which at present prevails.

Prices of land.—Farming lands under cultivation sell at $6 to $20 per acre; woodland, at $2 to $6 per acre, dependent on the situation, amount and kind of timber, and accessibility.

PAINT CREEK BASIN (COCKE COUNTY, TENN.).

Area.—Total, 18 square miles; cleared, 3 square miles; wooded, 15 square miles; severely burned, 3 square miles.

Surface.—The topography is very rough. The basin is a narrow, gorge-like valley walled on each side by steep and rugged mountains. There is no bottom land. Along 3 miles of the creek, in the middle of the valley, the land is [illegible] unsettled.



Soil.—The soils are sandy and poor. They are largely derived from quartzites and sandstones. Much of the land, especially on the southern slopes on the north and west side of the creek, is thin and very rocky.

Agricultural value.—Where they are at present cultivated, these lands produce scant crops of corn and small grain. On account of their porosity they are incapable of being brought to a high state of fertility and are subject to drying out very badly during the summer and fall.

Humus and litter.—Nearly all of the forest land, especially the dry southern slopes, has been badly burned, and there is very scant humus upon it, although where several years have passed since the last fire there is a heavy growth of brush and young timber.

Timber trees.—The forest is formed of oaks and chestnut associated with black pine. The stand is generally poor, and a great deal of the hardwood is stump sprouts or is defective from ancient fires. There is some locust, hickory, and occasionally white pine. In a few of the hollows are found characteristic Appalachian hard woods.

Yield.—The yield is about 1,500 feet B. M. per acre. Merchantable timber is found chiefly on the north slope of the mountain and on the upper part of the creek.

Demand.—There is a small demand for low-grade material, and a better demand for good quality.

Accessibility.—The Southern Railway crosses the mouth of the creek. There is a very poor road up the creek, but it could easily be improved if necessary.

Cutting.—No mills are cutting on the creek at present. The merchantable hard wood has been largely culled, except at the head. At several places along the creek there is some white and black pine, which seem to be in very good condition.

Second growth.—Second growth is very abundant in the burned woods and consists largely of oak sprouts and black-pine and white-pine seedlings.

Undergrowth.—Undergrowth, except young trees, is scant.

Rate of growth.—Accretion is slow, especially in the severely burned woodland.

Water power.—Water power is too limited to be of great value.

Ownership.—There are 17 families living on the creek, most of whom have small holdings.

Price of land.—Farming land sells at $4 to $20 per acre; woodland, at $1 to $3.

GULF FORK BASIN (COCKE COUNTY, TENN.).

Area.—Total, 52 square miles; cleared, 12 square miles; wooded, 40 square miles; severely burned, a large area.

Surface.—The upper part of the basin is a series of deep, narrow, nearly parallel gorges opening to the north, northwest, and west, indenting the northern slope of Max Patch and the associated mountains. The lower part of the basin is composed of broader valleys, with some level bottom adjoining the streams, and rolling uplands, which descend gently from the high surrounding ridges which girt the basin or form the crests of the watersheds between the chief tributary streams.

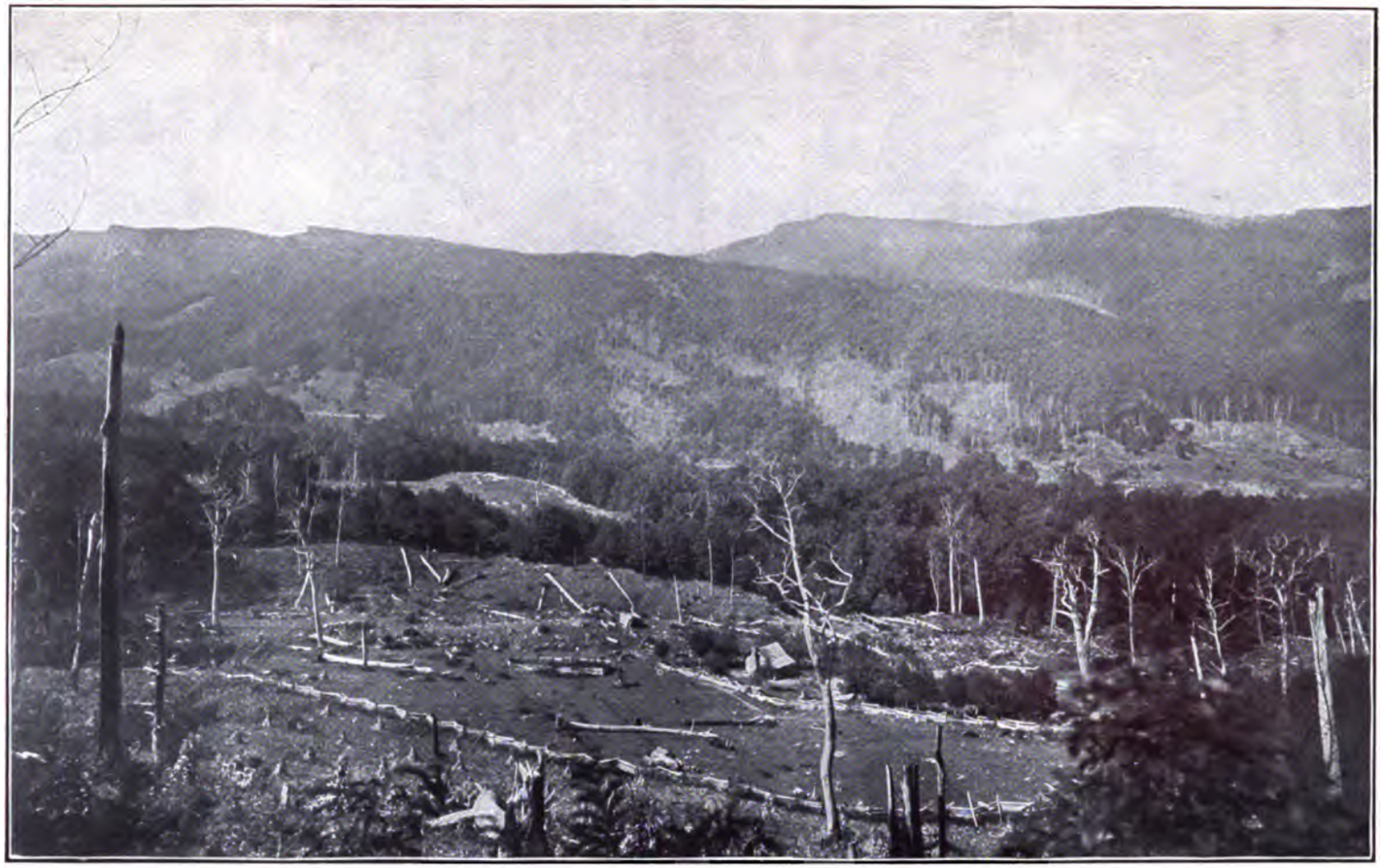
Soil.—The soil for the most part is a sandy loam. In a portion of the basin, especially in the rolling hills, the soils are derived from slates, and are generally poor, though stiff and deep. The soils that are derived from quartzite are confined to local areas, chiefly around Hall Mountain and the western part of the basin. They are sandy and rocky, and not fertile. In the upper part of the basin, on the north slope of Max Patch Mountain, the country rock is largely a coarse conglomerate, which yields a good, though sandy, soil where the slope is not too steep.

Humus and litter.—There is only a slight accumulation of forest litter on the poorer soils derived from slates and quartzite, but in the deep gorges at the heads of the streams there is a great accumulation of mold, especially toward the bottoms of the hollows.

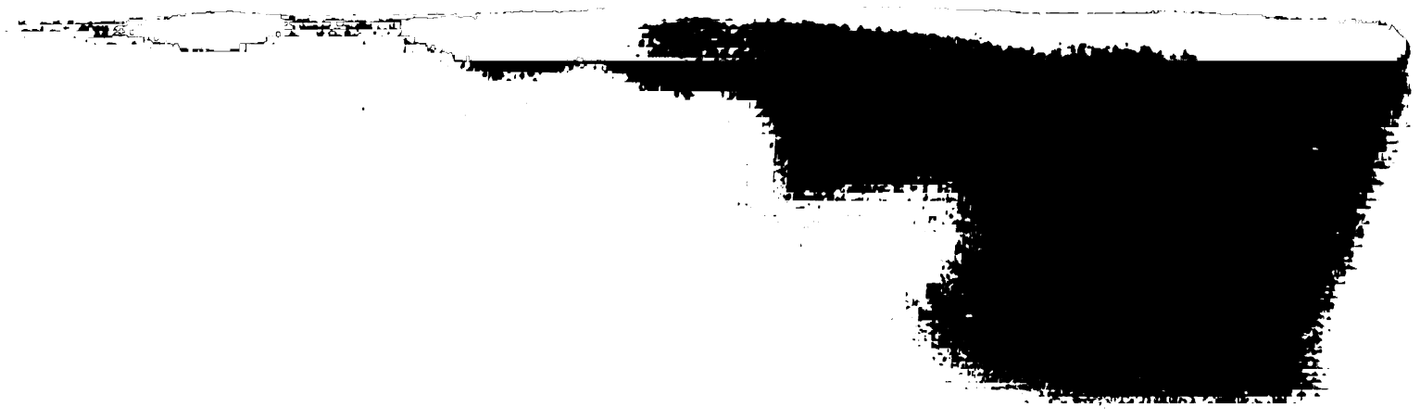
Agricultural value.—These lands are only fairly productive. Corn, wheat, and oats are grown, the corn chiefly on the alluvial lands. Rye is no longer a commercial crop. Some dark tobacco—burleys and other heavy leaves—is raised. Apples do well, especially on the upper waters of the streams. Grass does not do well on the uplands unless on moist north slopes or at high elevations.

Timber trees.—Chestnut, scarlet oak, white pine, white oak, hemlock, black pine, and chestnut oak, in relative abundance in about the order named, form the greater part of the existing forest. The black pine is largely confined to sunny slopes at a low elevation, especially where the soil is sandy and well drained. White pine is most abundant about the middle of the basin, though small groves and isolated trees also occur throughout the lower part of the valley. The hemlock is largely confined to the deep hollows at the head of the basin, where it forms an almost pure forest on the floor of the gorges.

Yield.—The upper portion of the basin will yield about 4,000 feet of hard woods and hemlock to the acre; the lower part of the basin, 1,500 to 2,000 feet B. M. per acre, largely white pine. Some of the black pine will yield merchantable timber, but the greater part of it is too knotty and rough to [illegible] but the



FOREST CLEARINGS FOR FARMING ON THE SOUTHERN APPALACHIAN MOUNTAINS.



coarsest lumber. There is about one cord of hemlock bark to the acre in the upper part of the creek. There is some excellent oak-tie timber in the lower part of the basin. Besides the timber suitable for milling, there are about 15 cords of small wood per acre in the lower part of the basin and nearly twice as much per acre in the upper part.

Demand.—Ash, oak, yellow poplar, and linn, and some white pine, are the kinds of timber now being cut. Only the best is taken, and this commands a price of from $1 to $3 per thousand feet.

Accessibility.—It is from 10 to 15 miles from the upper part of the creek, where cutting is now being carried on, to the nearest station on the Southern Railway. The wagon road is not good—climbing many hills and being badly washed in places. There would be but little difficulty in building a road to any body of timber, except in some of the deep gorges of the gulf.

Cutting.—There are at present three mills in operation on the creek, which are cutting hard woods and some of the best white pine. Their combined capacity is about 20,000 feet per day.

Fire.—Much of the best white-pine land has been badly burned, and many trees that would have otherwise been sound have butt rot, or hollows caused by fire. The dry and sandy black-pine lands are also burned at frequent intervals, and the young growth is suppressed or reduced to stool shoots, so that these woods have a stand seldom more than one-half normal.

Reproduction.—The pines reproduce freely, especially in abandoned fields and sunny places in the forest. Hard woods seed regularly, and reproduction can be easily secured by affording the proper light conditions. The hemlock does not reproduce so freely.

Second growth.—Where cattle are excluded there is an abundance of young trees of the species forming the forest. A great part of the land, however, is pastured. Reproduction is scant on burned areas, being largely limited to chestnut and oak sprouts, with occasional white pines and sourwood.

Undergrowth.—The upland woods are generally open on account of the cattle suppressing the young growth. Dense thickets of rhododendron occur under the hemlock on the moist lands.

Rate of growth.—The trees grow rapidly, even on the thin, sandy soils. The hard woods, however, do not become large on the sandy soils or where associated with the pines.

Water power.—There are several excellent locations for small mills on the stream, but the power that could be secured is not large, though it would be fairly constant on account of the streams rising in deep north hollows and the

amount of heavy forest at the head of the stream. The greater part of the cleared land lies in the lower part of the basin.

Ownership.—There are about 62 families in this basin. Much of the land in the upper part of the basin now in timber will be converted into small farms as soon as the timber is cut and the land is open to purchase.

Prices of land.—Farming land sells at $6 to $25 per acre; woodland, at $2 to $6 per acre.

PIGEON RIVER BASIN.

Topography.—Pigeon River rises among the Balsam and Pisgah mountains, cuts its way through the Unaka Mountains, and joins French Broad River on the Tennessee Plain. It drains an interior agricultural basin which is oval in outline, the longer axis northwest, parallel to the general course of the stream, and almost entirely within the Appalachian Mountain region. It is circumscribed by lofty mountains, with many peaks more than 6,000 feet in altitude. Many minor ranges springing from the surrounding mountains converge toward the middle of the basin, dividing it into deep, narrow valleys, except near its upper end, between the towns of Canton and Waynesville, where there is a broad open valley of alluvial plains and rolling hills, dotted with low mountains.

The basin has an area of 345,440 acres, of which 79 per cent is wooded.

Soil.—The soils are loams and sandy loams, mostly fine grained, derived from gneiss and schists, though in the mountains they are more siliceous and coarser, being the product of metamorphosed sandstones, quartzites, and conglomerates.

Agriculture.—This basin is well adapted to grass, except where very sandy, and grass is the chief product of the region. Corn ranks next in importance, while the cultivation of wheat is largely confined to the broad valley of the Pigeon, between Canton and Ferguson, and to the Richland and Fines Creek valleys. Apples are extensively raised and have a wide reputation for their quality. Truck farming is yearly assuming a larger importance.

The alluvial valley lands have been little injured by freshets, and as a rule the soils of the uplands have not suffered severely from erosion, though a few badly gullied slopes, due to the continuous cultivation of corn, are to be seen in the older settlements.

The forest.—Scarlet, black, and white oaks, associated with black pine, formed at one time an extensive forest on the hills between Canton and Waynesville, but this land, where not under cultivation, is now in second-growth forest. The forests of the mountains are of typical mixed Appalachian hardwoods, with a small amount of black spruce at high elevations in Balsam and Pisgah Ridges, and some white pine in the lower part of the basin, and have been culled early of the most valuable timbers.

The forest consists of 861,721 M feet B. M. log timber, and 6,499,880 cords of small wood. The proportions of log-timber species are as follows:

Proportions of species in Pigeon River basin.

	Per cent.
Oaks	30
Hemlock	7
Ash	3
Buckeye	4
Beech	2
Hickory	2
Chestnut	15
Spruce	1
Cherry	1
Black pine	1
Linn	4
Birch	5
Locust	1
White pine	2
Other species	10
Poplar	4
Cucumber	3
Black gum	1
Maple	4

All species reproduce excellently under proper light conditions and, under exclusion of fire and a judicious system of lumbering, there would be no difficulty in perpetuating this forest and increasing the proportion of valuable species in its composition.

EAST, WEST, AND LITTLE EAST FORKS OF PIGEON RIVER BASINS.

The three forks of Pigeon River, the East Fork, the West Fork, and the Little East Fork, drain the entire southern end of Haywood County, an elevated region lying between the Pisgah Ridge and the Balsam Mountains, and embracing an area of more than 70,000 acres. The average altitude of this area is about 4,500 feet, the valleys at their lowest points being more than 3,000 feet high, while nearly all of the mountains with their largest spurs rise to heights of from 5,000 to 6,500 feet. The topography is extremely rugged and, excepting for the narrow alluvial lands along the largest streams, there is no level land. The hollows of the smaller streams are narrow, with the slopes of their intervening ridges steep and extremely rugged and rough. This is especially so near the headwaters of the West and East forks, though occasional gentle slopes and rolling lands are to be found at the head of the East Fork,

HEMPHILL CREEK BASIN (HAYWOOD COUNTY, N. C.).

Area.—Total, 11 square miles; cleared, 3 square miles; severely burned, none; wooded, 8 square miles.

Surface.—For 1 mile above the mouth of the creek there are several small alluvial bottoms, and the hills are not steep. Above this, however, there is no valley land at all, and the slopes of the mountains are steep, and often precipitous and rocky.

Soil.—The soil is sandy and thin and not at all fertile in the lower part of the valley, and while sandy in the upper part of the valley, it will produce well until the organic matter has been exhausted. The alluvial bottoms are generally rocky.

Humus and litter.—There is a deep accumulation of humus in the hollows, even where the slopes are steep, but on the dryer slopes and along the crests of the ridges there is very little.

Agricultural value.—In spite of their rockiness the alluvial lands produce well, and the uplands also for the first few years.

Timber trees.—Mixed Appalachian hard woods, associated with hemlock, compose the forest; chestnut forms 35 per cent of the timber; oaks, 40 per cent; linn, buckeye, and maple, 10 per cent.

Yield.—The forest will cut about 3,000 feet B. M. per acre.

Demand.—Owing to the distance from any shipping point, Clyde and Waynesville being the nearest points, there is no demand except for the best timber, and seldom more than $2 per thousand feet B. M. is paid for that.

Accessibility.—The mouth of the stream is 8 miles from Waynesville, over a good wagon road, part of which is graded and macadamized.

Second growth.—Chestnut, associated with the oaks, forms the greater portion of the second growth. It is generally abundant in culled woods unless the grazing has been excessive.

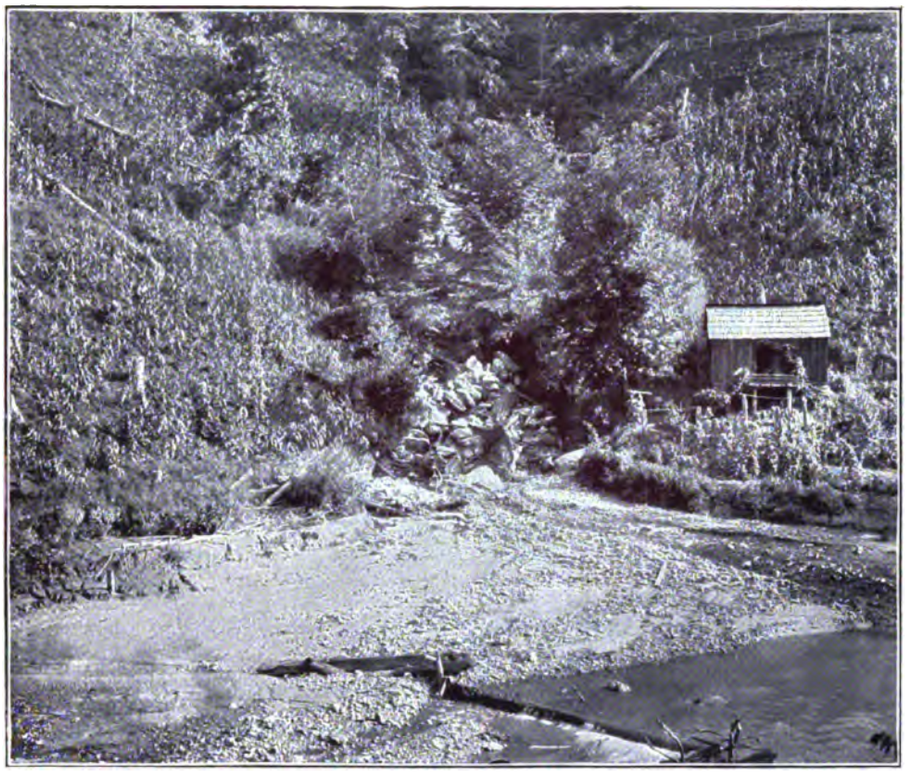
Undergrowth.—Rhododendron and *Kalmia* form the greater portion of the undergrowth, especially on damp slopes. There are in many places thickets of young trees, especially beech and maple.

Reproduction.—Young trees, especially oak and chestnut, are frequent wherever any cutting has been done.

Rate of growth.—Normal for this elevation and aspect.

Water power.—The available power is limited, as the stream is small. There is one small gristmill at present in operation.

Occupancy.—There are probably not more than 12 families living in the basin. Nearly all of the land that is suitable for tillage has been cleared, but more of the steep hillside land is yearly being brought into cultivation.



A. NEWLY CLEARED MOUNTAIN FIELD, PLANTED IN CORN, RAPIDLY WASHING AWAY.

B. RECENTLY CLEARED FIELD, IMPOVERISHED AND ABANDONED.

Fire.—Many fires set to make pasture, by which a large amount of log timber has been killed.

Reproduction.—Burns half restocked; too much brush elsewhere.

Second growth.—Inferior, on ridges burned too frequently; in lowlands there is too much brush.

Undergrowth.—In ravines and bottoms, dense laurel; on ridges, sprouts and herbs.

Rate of growth.—Average 1 inch on radius in eight years.

Water power.—Abundant.

Occupancy.—About 30 families are scattered through the mountains.

Prices of land.—Would average probably $2 per acre. None sold recently.

BIG CREEK BASIN.

Area.—Total, 31.48 square miles; cleared, 1.20 square miles; severely burned, 1.36 square miles; wooded, 28.92 square miles.

Surface.—Steep mountain slopes and narrow valleys, with very little bottom land.

Soil.—Light loam, except in coves, where dark and deep.

Humus and litter.—Light on ridges, abundant in coves and on northern slopes.

Agricultural value.—Only a few small areas in coves and bottoms have any value for farming.

Timber species.—Poplar, 10 per cent; hemlock, 20 per cent; linn, 5 per cent; cherry, 5 per cent; buckeye, 5 per cent; red maple, 5 per cent; sugar maple, 5 per cent; also peawood, cucumber ash, spotted oak, red oak, and white oak.

Yield.—Log timber, 74,240 M feet, B. M.; small wood, 190,000 cords.

Demand.—The best timber might bring $1 per thousand feet on the stump.

Accessibility.—The streams are not drivable. Railroad building would not be difficult.

Cutting and milling.—About 100,000,000 feet have been cut and removed. This timber was floated down Pigeon River. Local operators have hauled a small amount of sawed lumber to Newport.

Cutting.—Several small mills are operating along the foot of the mountain. Some bark is being peeled and hauled to Newport. The lower portion of the forest has been thoroughly culled of log timber. Newport is the nearest shipping point, and the haul, by wagon over rough roads, is not less than 15 miles.

Fire.—Fires have recently invaded the mountain slopes, being set freely to improve grazing, and have killed much timber, reducing [illegible] land. The timber that remains is in remote coves or on steep [illegible]

Reproduction.—Scant; fires are too frequent and brush [illegible]

Second growth.—Thrifty. Saplings are not abundant, except on wood lots adjoining the farm land.

Rate of growth.—Medium.

Prices of land.—From $2 to $5 per acre.

MOUNTAIN CREEK BASIN.

Mountain Creek rises under Stone Mountain and flows southward into Pigeon River about 4 miles below the State line. The valley is well settled and has some good farms in it, although most of the land in cultivation is hillside.

HURRICANE CREEK BASIN.

Hurricane Creek rises on the west side of Naked Place Mountain and flows southwestward into Pigeon River. The topography of its valley is not nearly so rough as that of the creeks below, and as the stream is longer its fall is not so rapid, and there are some extensive areas of rolling farm land and a few limited alluvial bottoms. The creek is well settled from 1 mile above its mouth to its headwaters. The forests along the lower part of the creek are composed largely of white pine, especially south of Hurricane Ridge—the watershed between this creek and Cold Spring Creek. Hard woods form the forests in the upper part of its basin. No culling has been done except for local use, as the distance from points of transportation is too great. The soils are sandy loams, derived largely from gneiss, and are fairly productive. Besides the usual crops which are found in the mountains, some bright tobacco is raised on this stream and carried to Clyde or Waynesville for sale.

CRABTREE CREEK BASIN.

The valley of this creek is extensive. It has numerous forks penetrating Oak, Crabtree Bald, Glade, and Newfound mountains. Many of the slopes are gentle, free from stone, and with good soil well adapted for grass, while there are extensive areas of level alluvial at Crabtree and at several points above. Nearly all of the available land is under cultivation, and there are many hillside farms on Glade Mountain and near the headwaters of the stream that are devoted largely to grass. The slopes of Crabtree Bald are rugged, and there are few farms to be found upon them. There was never very much white pine above the mouth of Rush Fork, the forest being almost entirely hard wood. Small mills have cut out nearly all of the best poplar, oak, and ash. There are probably, however, three to four million feet of hard-wood timber on the upper waters of the creek, largely in the numerous hollows which indent the Crabtree Bald. The distance from the forks of the creek to Clyde, the nearest railroad station, is about 10 miles.

road through the "Gulf" is reached. The old State road, lying at an elevation of 4,000 feet on the west slope of Max Patch Mountain, is the only means of reaching Waynesville, which is 22 miles from the head of Cold Spring Creek. There is no road down Cold Spring Creek and no post-office within 7 miles of the settlement on this stream.

Cutting.—No cutting has been done for commercial purposes on either stream, and as most of the farms are new, there has been but little culling for domestic use.

Fire.—Most of the southern slopes are burned over each fall, but the fires rarely pass beyond the leaves, destroying the young growth and occasionally injuring mature trees.

Reproduction.—All of the important trees seed frequently and would reproduce abundantly but for the fires. Small trees of nearly all the hard woods sprout from the stump, but there is little growth of this kind except from young seedlings killed by fires.

Second growth.—On account of the dense forest cover on the north slopes, there are few young trees beyond an occasional group of shade-enduring beech, hard maple, or hemlock. On south slopes and crests fires suppress young trees.

Undergrowth.—The woods are open below, and there is scant undergrowth beyond an occasional thicket of laurel or witch-hazel.

Rate of growth.—The rate of growth is very good, except on the dry ridges and southern slopes or where the ground has been robbed of its humus by fire. Yellow poplar and chestnut make excellent growth.

Water power.—There is a small sawmill, cutting only for local use, and a gristmill on Cold Spring Creek, and there are other available sites for small mills, but the power obtainable would not be over 20 horsepower.

Ownership.—There are 10 families on Cold Spring Creek, 1 on Ground Hog Creek and 9 at Waterville on Pigeon River, but their combined holdings are not large.

Prices of land.—Land, whether cleared or yet in timber, is valued at $8 to $12 per acre.

EAST FORK OF PIGEON RIVER BASIN (HAYWOOD COUNTY, N. C.).

Area.—Total, 49 square miles; cleared, 8 square miles; severely burned, 1 square mile; wooded, 41 square miles.

Surface.—The greater portion of the watershed is a deep, narrow valley about 18 miles long, surrounded, except near its mouth, by lofty ridges with steep and often rocky slopes. There are some alluvial bottoms of limited [illegible] and lower part of the stream, but these are not extensive and have been largely washed in places by terrible freshets, which are frequent on this stream.

Soil.—The soils are gray loams, often sandy, and for the most part rocky, derived from metamorphosed sandstone. The soils on the lower part of the creek are much better and deeper than those near the head, which are very thin and extremely rocky. The alluvial lands are sandy and light.

Humus and litter.—On north slopes and in hollows the leaf mold is deep. A great many of the southern slopes, however, have been badly burned or are suffering from excessive pasturage, and the humus has been greatly reduced.

Agricultural value.—Over limited areas, in spite of the steepness, the mountain slopes are productive, and yield excellent crops of corn and grass. In the greater part of the basin, however, the slopes are too sandy and thin to be profitably cultivated, except in fruit. At present, however, there is only a small amount of fruit produced. On account of their sandiness the bottom lands are not nearly so fertile as those on other parts of the river.

Timber trees.—Oaks form about 50 per cent of the forest; chestnut about 30 per cent. Associated with these are more or less maple, birch, ash, hickory, poplar, linn, and buckeye. In the deep, cold hollows at the head of the river there is a small amount of black spruce and some hemlock. The hard-wood growth at the head of the river is largely birch, mixed with beech, maple, and buckeye.

Yield.—Below the mouth of Pisgah Creek the best grades of merchantable timber have been cut, and the stand at present is not more than 2,000 feet B. M. per acre. Above this point there has been less culling and the stand will be from 3,000 to 5,000 feet B. M. per acre, except along the crests of the mountains and the steep southern slopes. The entire basin of Pisgah Creek has been badly burned and is lightly timbered. There is a small area of unculled forest at the head of the river.

Demand.—There is a strong demand for extra and shipping lumber on the lower part of the stream. Good timber brings from $1 to $3 per thousand feet on the stump.

Accessibility.—It is 25 miles from the head of the river to Clyde, the nearest railway station—a distance which absolutely prohibits logging. The road down the river is not good, though it could be improved very much at a slight cost. A proposed railroad has been surveyed through a gap at the head of the river, across the Pisgah Range, from Waynesville, N. C., to Spartanburg, S. C. Should this road be built the timber on this fork of the river would be about 3 miles from it.

Cutting.—Many mills have cut on the stream at various times, and the best grades of timber have been removed as far as the mouth of Pisgah Creek. Two

thirds of the tan bark has been cut for this distance also. At present there is only one mill cutting on the creek, but it is reported that several others will shortly move in, owing to the increase in the price of lumber.

Reproduction.—Reproduction is good where the land is not burned. A great deal of the land, however, is regularly and severely burned and the growth of young trees on these areas is largely suppressed.

Second growth.—Except on the lower part of the stream, which has been long settled up and where the farm woodland has been extensively culled, there is very little second growth. Oak and chestnut sprouts are the most important elements in the regrowth.

Undergrowth.—There are dense thickets of both rhododendron and *Kalmia* in a great part of the woodland at the head of the river.

Rate of growth.—Accretion is about normal for the various aspects and altitudes.

Water power.—The stream is very rapid, and there are several sites where high dams could be built, which would afford small powers for manufacturing plants.

Ownership.—The upper part of the basin is owned by a company. The forest land on the lower part is largely in small holdings.

Prices of land.—Farm land brings from $4 to $25 per acre; woodland, from $2 to $10 per acre.

JONATHAN CREEK BASIN ABOVE DELWOOD (HAYWOOD COUNTY, N. C.).

Area.—Total, 37 square miles; cleared, 7 square miles; wooded, 30 square miles; severely burned, 1 square mile.

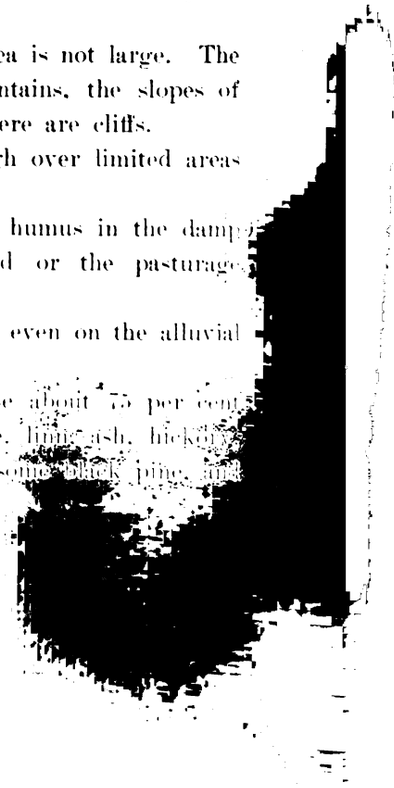
Surface.—There is some level valley land, but the area is not large. The basin lies between two lofty spurs of the Balsam Mountains, the slopes of which are steep and often very rocky. In a few places there are cliffs.

Soils.—Thin and light sandy soils predominate, though over limited areas they are stiffer and loamy.

Humus and litter.—There is a deep accumulation of humus in the damp hollows, but wherever the undergrowth has been burned or the pasturage excessive, as at present, there is scant humus.

Agricultural value.—The soils are not very productive, even on the alluvial lands, because of their sandiness.

Timber trees.—Chestnut and the oaks together compose about 75 per cent of the forest. There is a small amount of birch, maple, linn, ash, hickory, buckeye, and hemlock. On the lower dry hills there is some black pine, and some spruce on north slopes at high elevations.



Yield.—The best lands will cut more than 3,000 feet B. M. per acre; the poorer and dryer lands not so much.

Demand.—The best poplar brings about $4 per thousand feet on the stump; oak and other hard woods less. There are at present six small mills in operation, with a combined capacity of 40,000 feet per day. The best timber has been removed to within 4 miles of the head of the basin.

Accessibility.—A well-graded wagon road leads to Waynesville, 8 miles from Delwood.

Second growth.—Scarlet oak and chestnut form the greater portion of the second growth.

Undergrowth.—Small thickets of rhododendron and *Kalmia* form the underbrush, which is scant, except in the hollows.

Reproduction.—In the forest there is scant young growth, even where cutting has been in progress.

Rate of growth.—Accretion is about normal for the altitude.

Water power.—The stream is too small to afford sufficient power for any except very small mills.

Ownership.—There are many small tracts. About 25 families live above Delwood.

Prices of land.—Agricultural land sells at $10 to $50 per acre; woodland, at $2 to $20 per acre.

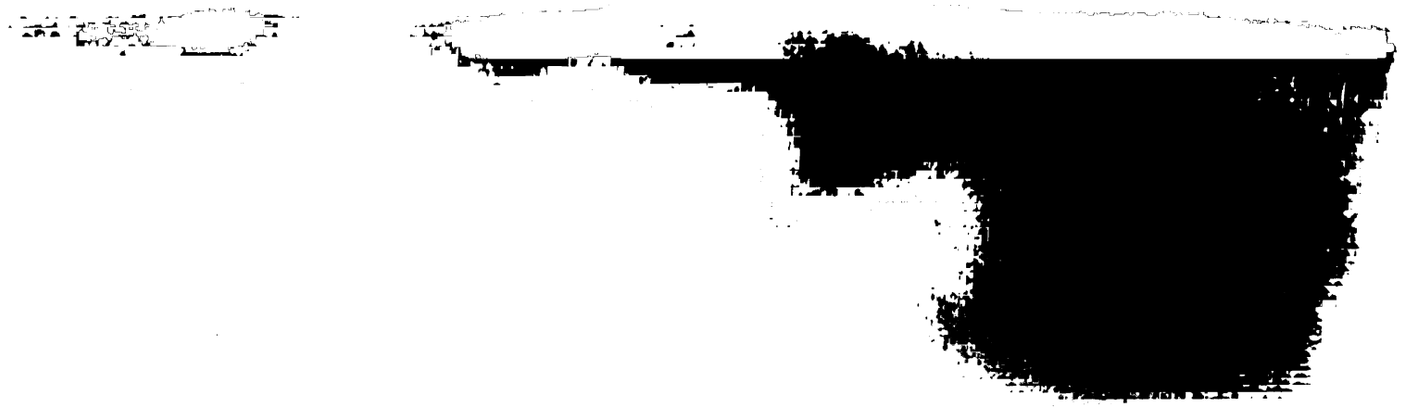
WEST FORK OF PIGEON RIVER BASIN ABOVE LAVINIA (HAYWOOD COUNTY, N. C.).

Area.—Total, 33 square miles; cleared, 5 square miles; wooded, 28 square miles; severely burned, 1 square mile.

Surface.—The stream flows in a gorge between Fork and Balsam mountains. In the lower part of the valley there are some small alluvial bottoms and a few gentle slopes, but in the upper part there are no bottoms. The slopes are steep, many of them very rough, rocky, and precipitous, and unsuited even for grazing. There are many tributary streams which have a rapid descent, and toward the heads of some of them are some gentle slopes, though the prevailing topography is extremely rough.

Soils.—The upland soils are generally loose and thin; those of the bottom lands are sandy and not very productive. The uplands are often rocky. On account of the prevailing aspect, which is northerly, and the surrounding high mountains and the great altitude, the region is very cold; this in itself tends to limit the productive power of the soils.

Humus and litter.—Leaf mold is generally very deep, except along the crests of ridges and on southern slopes, or on burned lands.



Timber trees.—Oak and chestnut form the greater part of the forest. There is some birch, ash, linn, maple, poplar, and hemlock on the north slopes and in the hollows.

Yield.—The forest will cut about 2,000 feet B. M. to the acre.

Demand.—There is some local demand for low grades of timber for farm use, and a strong demand for better grades of timber for shipping lumber. Good timber brings from $1 to $2 per thousand feet on the stump.

Accessibility.—It is 7 miles from the nearest point in the valley to Clyde, the nearest railway station.

Cutting.—Several mills have at times cut on the stream, and the best portion of the more accessible timber has been used. Two mills are at present cutting, with a combined capacity of about 5,000 feet B. M. per day.

Second growth.—In connection with the farms there is a considerable amount of oak and chestnut coppice woodland, and there is a small amount of second growth appearing in the forest where culling has been in progress.

Undergrowth.—The forest is generally free from undergrowth, except occasional thickets of rhododendron and *Kalmia*, or brush, which has followed fires.

Reproduction.—Most of the species reproduce well where the proper light conditions are afforded for germination and growth. The pasturage of cattle and sheep tends to suppress young growth.

Rate of growth.—Accretion is normal for the aspect and elevation.

Water power.—The stream is too small to afford more than a limited power, but has ample fall. A sawmill and gristmill and other small mills are at present utilizing a portion of the power.

Ownership.—The greater portion of the forest land is divided into small holdings, in the possession of residents.

Occupancy.—The entire basin is thickly settled from the head of the stream to its mouth.

Prices of land.—Farming land sells at $5 to $40 an acre; woodland, at $3 to $12 an acre.

NORTHWESTERN SLOPE OF SMOKY MOUNTAINS.

Topography.—This tract is a mountain side between altitudes of 1,500 and 6,700 feet, and is drained by Little Pigeon and Little rivers into Holston River, and by Abrams Creek into Little Tennessee River. The surface is eroded into fan-shaped basins, very steep, and often precipitous near the summit, with high narrow ridges dividing the main drainage basins. There is no alluvial land of consequence, except at Briar Cove, Gatlinburg, Tuckaleechee Cove, and Cades Cove.

The tract has an area of 254,720 acres, of which 92 per cent is wooded.

Soil.—In general the soil is light colored and shallow, especially on the ridges and steep slopes. In the coves, however, and along the foot of the ridges, where the slope is more gentle, humus has accumulated, and the soil is fertile. In general physical quality the soil is loam or clay loam.

Agriculture.—Corn is the principal farm crop, and 50 bushels per acre are sometimes grown on the best lowlands. This land can not compete with the alluvial river bottoms, however. Most of it is farmed only because it is cheap land. The higher altitudes are favorable to fruit, grass, and vegetables, and also to stock raising in a limited degree, as cattle may roam in the woods and subsist on seedlings, shrubs, and weeds, and hogs in occasional years find abundant mast.

As a rule the earth is fairly well covered and thus protected from erosion, but the few old pastures are worn and gullied here, as elsewhere, on hilly land.

In this region streams heading in unbroken forest are notably clear and show little fluctuation, while those from cleared lands are muddy and inconstant. While present erosion is limited, there is evidence that it would be very great if large areas of the earth were uncovered.

The forest.—With the exception of a few "balds" or grassy areas on the higher summits and the alluvial lands of the lower coves and creek valleys, the forest of this great mountain side is practically unbroken. The tracts contain 926,160 M feet B. M. log timber, and 5,719,200 cords of small wood.

Over 100 species of trees grow here, an unusually large number for one locality. Northern and southern trees are close neighbors, and all may be seen between elevations of 1,500 to 6,700 feet. The proportions of timber species are as follows:

Proportions of timber species on northwestern slope of Smoky Mountains.

	Per cent.
Oak	20
Ash	2
Hemlock	10
Peawood	1
Black gum	2
Other species	12
Maple	5
Black pine	2
Chestnut	12
Spruce	2
Cherry	1
Buckeye	1
Beech	2
Hickory	1

Proportions of timber species on northwestern slope of Smoky Mountains—Continued.

	Per cent.
White pine	3
Poplar	4
Cucumber	2
Linn	5
Birch	7
Locust	1

While some remarkably fine timber trees are here, the general average is far inferior to what might be grown with so favorable a soil and climate. Fire, grazing, and culling have reduced this forest considerably. Imperfect trees and inferior species are abundant, while some of the burns and cattle ranges are deficient in stand.

Hardly any other forest in the country would respond so readily to the forester's care and demonstrate so plainly that nearly all of this tract is best adapted to timber growing.

NORTH SLOPE OF WHITE ROCK MOUNTAIN (COCKE COUNTY, TENN.).

Boundaries.—On the north, the foot of the mountain; on the east, Pigeon River; on the south, the mountain summit; and on the west, the eastern divide of Little Pigeon River and the north slope of Smoky Mountain, between Pigeon River and the eastern divide of the East Fork of Little Pigeon River.

Area.—Total, 32 square miles; cleared, 6.32 square miles; burned, 3.48 square miles; wooded, 22.20 square miles.

Surface.—Steep mountain slopes, frequently rocky and precipitous, grading into foothills deeply cut by watercourses.

Soil.—Light colored and shallow, except in a few coves.

Humus and litter.—Light. Much has been burned away by recent fires.

Agricultural value.—Corn, rye, and oats are light, except on some new ground in the coves. Fruits do well in the higher coves.

Timber trees.—Poplar, linn, ash, the oaks, red and sugar maple, gum, cherry, walnut, and cucumber, with some pine along the foothills. Merchantable timber is distributed among these species about in the order named.

Yield.—Log timber, 28,160 M feet B. M.; small wood, 200,000 cords.

Demand.—Two dollars per thousand feet on the stump is now paid for poplar. Other species mentioned above are cut in connection with poplar logging, but seldom bring more than 50 cents per thousand feet.

Accessibility.—There is little or no log timber near the wagon roads. Logging is usually difficult because of steep and brushy slopes.

Reproduction.—Free, except where much pastured or burned.

Second growth.—There is usually an abundant stand of saplings.

Undergrowth.—Dense laurel lines the bottoms. There are many seedlings elsewhere, except where closely pastured.

Rate of growth.—Rapid.

Water power.—Abundant on the main creek.

Occupancy.—About 25 families are scattered along the lower course of the creek and in the coves about its head.

Prices of land.—Mountain land is valued at $1 to $4 per acre; farm land, at $5 to $15.

BRIAR COVE DISTRICT (SEVIER COUNTY, TENN.).

Boundaries.—The divides comprising all of the drainage basin of the East Fork of Little Pigeon River above the mouth of Webb Creek.

Area.—Total, 65.32 square miles; cleared, 5 square miles; burned, 3 square miles, wooded, 57.32 square miles.

Surface.—Mountainous, with small areas along the river and in coves smooth enough to be arable.

Soil.—Very fertile in coves and along the river, but on ridges light and unproductive.

Humus and litter.—Abundant, except on the higher ridges and on some burns in the valley of the East Prong.

Agricultural value.—Most crops do well. Grass, corn, and fruit are the principal crops grown.

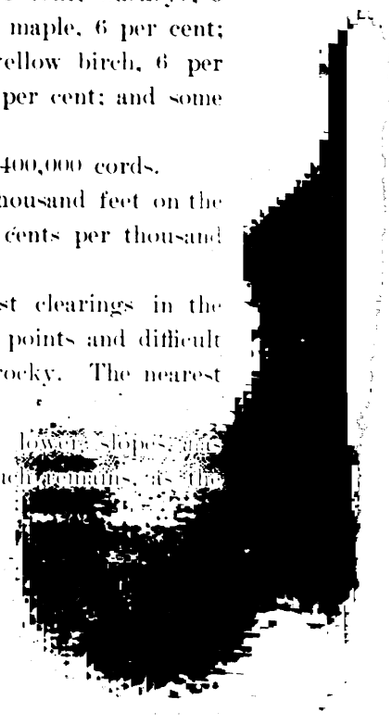
Timber trees.—Hemlock, 5 per cent; red oak, 5 per cent; scarlet oak, 6 per cent; poplar, 1 per cent; cherry, 2 per cent; peawood, 4 per cent; buckeye, 5 per cent; cucumber, 5 per cent; red maple, 6 per cent; sugar maple, 6 per cent; gum, 3 per cent; spruce, 5 per cent; beech, 3 per cent; yellow birch, 6 per cent; sweet birch, 6 per cent; linn, 5 per cent; chestnut, 10 per cent; and some white oak, black oak, butternut, walnut, and hickory.

Yield.—Log timber, 138,240 M feet B. M.; small wood, 400,000 cords.

Demand.—Poplar, ash, and cherry are worth $2.50 per thousand feet on the stump, while linn, buckeye, gum, maple, etc., bring only 50 cents per thousand feet.

Accessibility.—Portable mills are set near the uppermost clearings in the main valleys. The standing timber is nearly all above these points and difficult of access. The slopes are steep, and the roads must be rocky. The nearest shipping points are Newport and Sevierville.

Cutting.—The most accessible timber, including all the lowest slopes, has been culled out. Some tan bark has been taken out, but much remains, as the prices have been too low.



Fire.—Most of the ridges have been burned over, and much of the timber on them has been killed and replaced by brush.

Reproduction.—Best adjoining clearings. In high altitudes there is too much brush.

Second growth.—Few good stands of saplings were seen, except on wood lots.

Undergrowth.—Laurel and other brush is usually dense.

Rate of growth.—Rapid. See general notes for trees measured here.

Water power.—Abundant; the river is large, rapid, and fairly constant.

Prices of land.—From $2 to $10 per acre.

ALUM CAVE CREEK DISTRICT (SEVIER COUNTY, TENN.).

Boundaries.—The divides comprising the entire drainage basin of West Pigeon River above the mouth of Dudley Creek.

Area.—Total, 35.48 square miles; cleared, 5 square miles; burned, 1 square mile; wooded, 29.48 square miles.

Surface.—Very steep mountain sides, except about 6 square miles of arable land near Sugarville and Gatlinburg.

Soil.—Fertile.

Humus and litter.—Abundant.

Agricultural value.—Grass, corn, and fruit do well. Small grains are grown, but corn is preferred.

Timber trees.—Yellow birch, 5 per cent; sweet birch, 4 per cent; chestnut, 10 per cent; red oak, 8 per cent; chestnut oak, 10 per cent; white oak, 8 per cent; scarlet oak, 5 per cent; black oak, 2 per cent; sugar maple, 5 per cent; red maple, 3 per cent; buckeye, 8 per cent; cucumber, 4 per cent; poplar, 1 per cent; linn, 2 per cent; ash, 3 per cent; peawood, 3 per cent; spruce, 5 per cent; hemlock, 10 per cent; cherry, 1 per cent; gum, 2 per cent.

Yield.—Log timber, 57,778 M feet B. M.; small wood, 277,000 cords.

Demand.—Only the poplar, cherry, linn, ash, walnut, and peawood are considered of value. These sometimes bring $2 per thousand feet on the stump.

Accessibility.—Streams are not drivable, and the upper portions of the valleys are difficult for road making. The mountain slopes are steep and brushy.

Cutting.—The log timber that remains is not considered worth taking out.

Fire.—There are some scalds on ridges. About 500 acres are severely burned. Lighter fires have reduced the timber on the drier portions, yet the spruce is sparse and scrubby.

Reproduction.—Except for the fires, reproduction would be free. Peawood comes in abundantly on old pastures, and the oaks reappear quickly on the mountain sides.

Second growth.—Saplings are abundant and usually of the same species that occupied the ground before.

Undergrowth.—There is much laurel in ravines and huckleberry on the ridges.

Rate of growth.—Rapid.

Water power.—Abundant.

Prices of land.—The best tracts of considerable size could be bought for $10 per acre.

LITTLE RIVER BASIN ABOVE ELI M'CARTER'S (SEVIER COUNTY, TENN.).

Area.—Total, 27.64 square miles; all wooded.

Surface.—Moderately mountainous. Many of the slopes are very steep; the bottoms are very narrow.

Soil.—Generally fertile.

Humus and litter.—Abundant.

Agricultural value.—Mostly too steep for cultivation. Probably 600 acres arable, on which corn, grass, and fruits would do well.

Timber trees.—Same as Alum Cave district, except more hemlock (13 per cent) and peawood (5 per cent).

Yield.—Log timber, 105,366 M feet B. M.; small wood, 353,792 cords.

Demand.—Although densely timbered with valuable species, the timber has no stumpage value.

Accessibility.—Difficult. The river below flows through a crooked canyon about 15 miles before reaching drivable water near Tucaleechee Cove. Access by rail would require heavy grading.

Cutting.—No cutting has been done.

Fire.—A few small fires have occurred.

Reproduction.—The burns have been restocked with brush rather than with timber trees.

Second growth.—The forest is well supplied with saplings standing between the large old trees.

Rate of growth.—Rapid; the trees are very thrifty.

Water power.—Abundant.

Prices of land.—The whole basin could probably be bought for $1 to $5 per acre.

JAKES CREEK BASIN (SEVIER COUNTY, TENN.).

Area.—Total, 4.42 square miles; cleared, 0.50 square mile; burned, 1 square mile; wooded, 2.92 square miles.

Surface.—Hilly to mountainous; but few of the slopes are very steep.

Soil.—Fertile.

Humus and litter.—Abundant.

Agricultural value.—Very productive where cleared. Corn, grass, and fruits are the principal crops.

Timber trees.—Same as Alum Cave district, with the addition of gopherwood and holly.

Yield.—Log timber, 17,715 M feet B. M.; small wood, 40,000 cords.

Demand.—Stumpage values are low because access is difficult. Best export timber brings $2 per thousand feet on the stump.

Accessibility.—Naturally difficult. A fair wagon road has been built from Sevierville via Wear Valley. The slopes are steep and brushy.

Cutting.—Small mills have been operated for some years. One is now cutting the timber from the upper coves.

Fire.—Fires have run over most of the ridges, on which about half the trees are dead. The coves have escaped severe fire.

Reproduction.—Free. On recent burns there are many small seedlings.

Second growth.—The original forest is well supplied with saplings, but few are left on the burned areas.

Undergrowth.—Except in the ravines, where laurel is abundant, the underbrush has been reduced by fire and grazing.

Rate of growth.—Rapid.

Water power.—A stream 15 feet wide by 1 foot deep, with a swift current, falls rapidly through its entire course.

Prices of land.—From $2 to $5 per acre.

LITTLE RIVER BASIN BELOW ELI M'CARTER'S (SEVIER COUNTY, TENN.).

Boundaries.—The divides comprising all of the land draining into the East Fork of the Little River below Eli McCarter's, except that draining into Jakes Creek.

Area.—Total, 24.20 square miles; cleared, 0.56 square mile; wooded, 23.64 square miles.

Surface.—Very steep and rocky, except Little Greenbrier Cove, on the Wear Cove road.

Soil.—Light, except in coves.

Humus and litter.—Light; mostly consumed by fire.

Agricultural value.—Slight.

Timber trees.—Black pine, 7 per cent; red oak, 10 per cent; black oak, 4 per cent; chestnut oak, 5 per cent; ash, 2 per cent; scarlet oak, 10 per cent; white oak, 1 per cent; red maple, 7 per cent; sugar maple, 10 per cent; birch, 10 per cent; peawood, 10 per cent; linn, 12 per cent; hemlock, 4 per cent;

A. SPRUCE FOREST NEAR SUMMIT OF WHITE TOP MOUNTAIN, VIRGINIA.

B. OVER-MATURE AND DYING SPRUCE FOREST, GRAYSON COUNTY, VA.

Cutting.—A small mill has been operated about 4 miles from the head of this stream, but at little or no profit. Several hundred thousand feet of lumber have been sawed.

Fire.—Many fires have been set along the road, and much of the forest near it has been killed. The remote portions are but slightly injured.

Reproduction.—Free where fires are not repeated. White pine comes in freely.

Second growth.—Saplings are abundant.

Rate of growth.—Medium to rapid.

Water power.—Limited. The stream is small.

Prices of land.—The whole tract could probably be bought for $1 per acre.

CADES COVE DISTRICT (BLOUNT COUNTY, TENN.).

Boundaries.—The divides comprising all of the drainage basin above the junction of Cove and Forge creeks.

Area.—Total, 37.62 square miles; cleared, 7.08 square miles; burned, 0.24 square mile; woodland, 30.30 square miles.

Surface.—A large, wide valley of rolling land, surrounded by mountains having steep slopes, which merge into foothills of moderate slope near the bottom.

Soil.—Light, except in coves. In the valley is much so-called "dead land," where the soil seems to contain some ingredient unfavorable to plant growth. The areas of this sort are not large, however.

Humus and litter.—Usually light, owing to repeated fires and much grazing.

Agricultural value.—The large area of arable land, practically all of which is cleared, produces much less than one would expect. The coves about the foot of the mountains, however, are quite productive, yielding fair crops of corn and grass.

Timber trees.—Chestnut, 30 per cent; chestnut oak, 20 per cent; hemlock, 12 per cent; white pine, 12 per cent; sugar maple, 6 per cent; red gum, 4 per cent; black birch, 4 per cent; black oak, 6 per cent; and others, 6 per cent.

Yield.—Log timber, 96,960 M feet B. M.; small wood, 291,000 cords.

Demand.—There is no demand except for local use, and the timber has practically no stumpage value.

Accessibility.—The nearest shipping point is Maryville, and two mountain ranges have to be crossed to reach the railroad. The timber land itself, however, is not especially difficult of access.

Cutting.—There has been very little cutting, except for local uses. The larger proportion of the timber has been burned in clearing.

Fire.—Fires are set whenever they will run, and the forest shows the effect

of this practice. The brush is subdued; the timber is frequently scorched at the butt, often killed.

Reproduction.—Seedlings are kept down by cattle and fires. except on a few old fields, where thrifty pines and oaks are abundant.

Second growth.—Abundant saplings promise better timber than the original forest. These must have started at a time when fires were less prevalent than now.

Undergrowth.—Reduced by burning and grazing.

Rate of growth.—Rapid, except on ridges.

Water power.—The streams are small. The largest, where leaving the tract, was about 25 feet wide and 1 foot deep September 1, 1900.

Ownership.—The resident population hold the cleared land and perhaps as much woodland adjoining. There are perhaps 140 families resident on this tract.

Prices of land.—The best farm in the valley can be bought for $5 per acre. Fifty cents an acre is considered a good price for mountain land.

ABRAM CREEK DISTRICT (BLOUNT COUNTY, TENN.).

Boundaries.—The divides comprising all the land drained by the stream, except Cades Cove, above the forks of Cove and Forge creeks and the south slope of Chilhowee Mountain.

Area.—Total, 49.14 square miles; cleared, 1.92 square miles; woodland, 47.22 square miles.

Surface.—Hilly to mountainous, with very small arable areas in valleys (about 2 square miles).

Soil.—Very light on ridges. Moderately fertile in valleys and coves.

Humus and litter.—Light. Nearly all consumed by the numerous fires.

Agricultural value.—Very slight, except in the few narrow bottoms and small coves. Not over 1,300 acres adapted to agriculture.

Timber trees.—White pine, 20 per cent; hemlock, 10 per cent; black pine, 10 per cent; scarlet oak, 10 per cent; black oak, 2 per cent; white oak, 5 per cent; red oak, 5 per cent; chestnut, 12 per cent; chestnut oak, 10 per cent; poplar, cherry, and ash together, 2 per cent; maple, 2 per cent; birch, 2 per cent; cucumber, peawood, hickory, and others, 10 per cent.

Yield.—Log timber, 90,662 M feet B. M.; small wood, 302,000 cords.

Demand.—The best price has been $1 per thousand feet on the stump.

Accessibility.—Most of this land is difficult of access. There are no special obstructions to railroad building, however.

Cutting.—Very little cutting has been done, except along the lower portion of the stream.

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Fire.—Fires are very frequent. Many trees have been injured or killed, but no large areas are entirely deadened.

Reproduction.—Very scant, owing to the numerous fires and the close grazing. On moist land seedlings come in quite freely, the pines most abundant of all.

Second growth.—Inferior. Under fire and grazing this forest is degenerating.

Undergrowth.—Very little.

Rate of growth.—Fair in hollows, but slow on ridges.

Water power.—Several good mill sites are along the lower stream, especially near the mouth.

Prices of land.—The best farms are offered at $5 per acre. Most of the woodland can be bought for 50 cents per acre.

CHILHOWEE MOUNTAIN (BLOUNT COUNTY, TENN.).

Boundaries.—This area includes that portion of the Chilhowee Mountain (on the Knoxville topographic sheet) west of the Montvale road.

Area.—Total, 13.28 square miles; cleared, 0.48 square mile; wooded, 12.80 square miles.

Surface.—Mountainous; steep and rocky.

Soil.—Very light.

Humus and litter.—Scant.

Agricultural value.—Nothing.

Timber trees.—South slope: Black pine, .50 per cent; black oak, 20 per cent; red oak, 6 per cent; scarlet oak, 5 per cent; white oak, 5 per cent; chestnut oak, 5 per cent; hickory, 5 per cent; and chestnut, poplar, ash, and others, 4 per cent.

Yield.—Log timber, 24,576 M feet B. M.; small wood, 82,000 cords.

Demand.—One dollar per thousand feet on the stump is considered a good price for the best of the log timber.

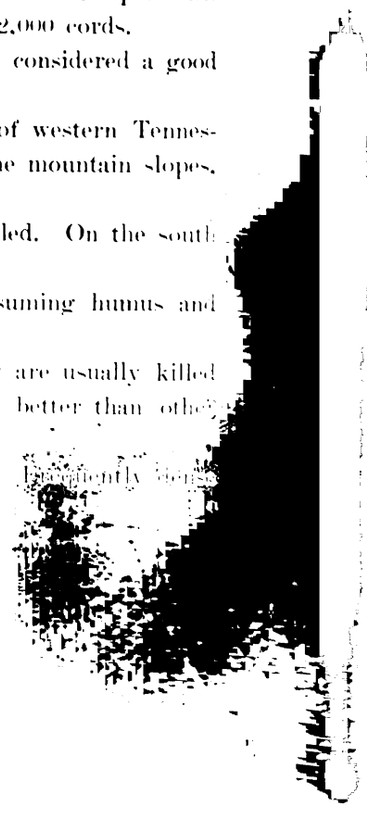
Accessibility.—Fair. Wagon roads lead to the lowlands of western Tennessee and down Abram Creek to Little Tennessee River. The mountain slopes, being quite steep and rocky, are rather difficult for logging.

Cutting.—The northern foot of the mountain has been culled. On the south slope no timber has been cut, except for local use.

Fire.—Fires are very frequent, killing sprouts and consuming humus and litter.

Reproduction.—Scant. Many seedlings start up, but they are usually killed by fire and grazing. Under these conditions pine reproduces better than other species.

Second growth.—Light and defective on the south slope. Frequently better on the north slope, especially in the coves.



Undergrowth.—Very light, owing to fires and grazing.

Rate of growth.—Not rapid, except in the few areas along watercourses.

Water power.—None.

Prices of land.—One dollar per acre is probably a good price.

TENNESSEE GAP (BLOUNT AND MONROE COUNTIES, TENN.).

Boundaries.—This tract covers all the remaining portion of the land draining into Little Tennessee River, north and east of that stream, between Abram Creek and the North Carolina State line.

Area.—Total, 19.08 square miles; cleared, 0.24 square mile; wooded, 18.84 square miles.

Surface.—Mountainous; about 800 acres along river and creek bottoms and in coves on the mountain side are arable.

Soil.—Light on ridges; medium in hollows.

Humus and litter.—Variable. Abundant in a few coves that have escaped fire, but scant elsewhere.

Agricultural value.—There are some good farms along the river bottom and some of the creek bottoms, and a few of the coves are worth cultivating.

Timber trees.—Hemlock, 15 per cent; chestnut oak, 15 per cent; black oak, 20 per cent; white pine, 20 per cent; black pine, 10 per cent; red oak, 3 per cent; white oak, 3 per cent; birch, maple, cherry, hickory, black gum, and sweet gum together, 14 per cent.

Demand.—The best floatable timber reasonably accessible is worth $2 per thousand feet on the stump. White pine is not worth over $1 per thousand feet.

Accessibility.—This is the most accessible portion of the Smoky Mountains. Tennessee River affords good transportation and passes within 5 miles of the remotest part of the tract.

Cutting.—Very little log timber has been removed. Floatable timber is now being cut on Silver Creek, where 200,000 feet and 250 cords of bark are ready to be sent down river.

Fire.—Surface fires are very frequent. But little humus or litter is left.

Reproduction.—Where protected by moisture seedlings come in rapidly; but on the ridges reproduction is very scant, owing to fire and grazing.

Second growth.—Saplings are abundant only in damp places. The forest on the ridges will soon deteriorate for lack of young stock.

Undergrowth.—Greatly reduced by fire and grazing.

Rate of growth.—Less than eastward along the range.

Water power.—Streams are too small for much power.

Prices of land.—This tract is assessed at about $1 per acre.

CAT CREEK BASIN (MACON COUNTY, N. C.).

Area.—Total, 13 square miles; cleared, 2 square miles; wooded, 11 square miles; severely burned, none.

Surface.—In the lower part of the basin are low, rounded hills, broken in places by low mountains. Above is a long, narrow valley between high mountains with steep slopes. The stream heads in the Cowee Mountains and flows southwest. There is only one large tributary, which heads to the south of Onion Mountain and flows west into the main creek, about 4 miles above its mouth.

Soils.—The soils in the lower part of the basin are red and stiff loams, derived from schists and sandstone. They are deep and generally free from stones, but wash badly on denudation. Some of this land is badly worn by injudicious cultivation. The soils in the upper part of the basin are gray, generally coarse-grained loams. In spite of the steep slopes the land is not washed badly. There is a considerable amount of alluvial land in the middle and lower parts of the basin.

Humus and litter.—Leaf mold is thin on the south slopes and on the lower hills. There is an excellent ground cover, however, on most of the north slopes and in the coves.

Agricultural value.—The alluvials and the stiff red lands are productive. The mountain lands are less so. The staple crops of the region are raised.

Timber trees.—The oaks form 50 per cent or more of the forest; chestnut, about 30 per cent; hickory, yellow pines, birch, ash, and maple, the greater portion of the rest of the forest.

Yield.—The forest lands will cut about 2,000 feet B. M. per acre.

Demand.—Good oak, ash, and poplar are in active demand for shipping lumber. Yellow pine and low-grade hard-wood lumber are in demand for local use.

Accessibility.—It is 14 miles from the creek to Dillsboro, the nearest railway station, by a road which leads across the Cowee Mountains.

Cutting.—At present no mills are in operation on the creek, but the best grades of timber have already been cut.

Reproduction.—All the trees reproduce well by seed, especially the oaks, chestnuts, and yellow pines. The oaks and chestnut sprout freely from the stump on cut-over land.

Second growth.—There are some fine groves of second-growth pine and a considerable amount of second-growth hard woods in the lower part of the valley.

Undergrowth.—The forests are generally open.

Rate of growth.—Both hard woods and pine grow rapidly.

River and Scott Creek, and there are many badly worn steep slopes on these streams and elsewhere.

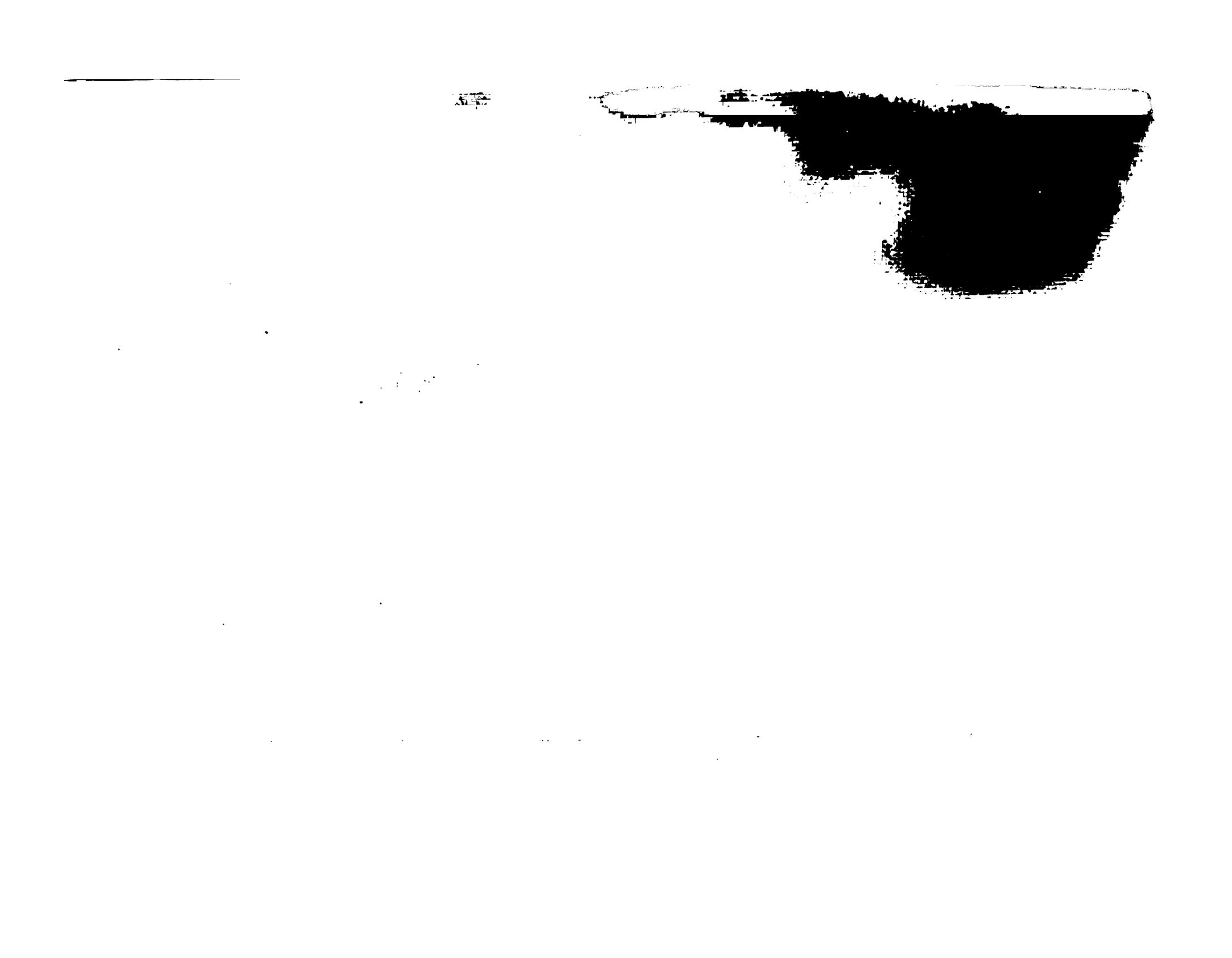
The forest.—In general, the mountain ranges and spurs, and also the ridge lands of the valleys, are still principally wooded, although many clearings are found in mountain coves and on mountain slopes. The principal clearings, however, are on and about the alluvial lands. The largest unbroken forest areas lie on Oconalufty, Cheowah, and Tuckasegee rivers, in the northern, northwestern, and northeastern parts of the basin, though there are some areas of fine forest at the head of Nantahala and Little Tennessee rivers, at the southern part of the basin. The forest contains 2,577,419 M feet B. M., and 14,931,190 cords of small wood.

The best timber has been largely culled for 20 miles from the Southern Railway, which crosses the middle of the basin. Repeated forest fires, started with a view to improve the pasturage, have destroyed much timber on dry south slopes, and by continued suppression of the young growth have greatly reduced the density. Reproduction, however, is good, and if the open woods were protected there would soon be a fine young growth beneath the old trees. Proper distribution of species could easily be secured by judicious cutting.

At lower elevations the forests are of oaks and hickories, associated with black pine. On the thin soil of the slopes, along the Blue Ridge, small scarlet and white oaks, with occasional bodies of hemlock, form the forest; while elsewhere in the mountains typical Appalachian hard woods prevail, with some few thousand acres of black spruce, capping the highest summits of the Smoky and Balsam mountains. The proportions of timber species are as follows:

Proportions of timber species in Little Tennessee River basin.

	Per cent.
Oaks	40
Hemlock	5
Ash	2
Linn	3
Black pine	1
Birch	3
Chestnut	20
Spruce	1
Other species	10
Black gum	1
Maple	2
White pine	1
Poplar	3
Cucumber	1
Buckeye	2
Beech	1
Hickory	4



Water power.—The stream is too small to yield more than a very limited power.

Ownership.—The forest land is largely held by residents.

Prices of land.—Agricultural lands sell at $5 to $50 per acre; forest land, at $1 to $4 per acre.

WATAUGA CREEK BASIN (MACON COUNTY, N. C.).

Area.—Total, 14 square miles; cleared, 4; wooded, 10 square miles; severely burned, none.

Surface.—Watauga Creek heads on the elevated slopes of the Cowee Mountains, and flows southwest into Little Tennessee River. The lower part of its basin lies within the river hills of Little Tennessee River, which are broad and have gently rounded slopes. The slopes on the upper part of the stream are very steep, in many places almost precipitous, and in a few places rocky.

Soils.—On the upper part of the stream the soils are gray loams, derived from gneiss, generally deep, though in some places shallow and rocky. In the lower part of the basin the soils are generally red, derived from sandstone or schists, in some places sandy and coarse grained and in others stiff and clayey. They are deep, however, but wash badly on denudation and when exposed by clean tilling.

Humus and litter.—In most places leaf mold is scant, as the prevailing aspect is southerly and the slopes are steep, but in the deep hollows at the head of the stream, where protected from drying, the humus is often deep.

Agricultural value.—The bottoms, which are confined largely to the lower part of the stream, are very productive. The red lands produce the best small grain. Corn, however, is the staple crop. The greater part of the steep land at the head of the creek is in grass.

Timber trees.—The oaks compose about one-half of the forest; chestnut about one-fourth. There are small amounts of maple, linn, buckeye, hickory, and ash, and some yellow pine on the lower red hills. The poplar has nearly all been cut and the best of some of the other timbers.

Yield.—The yield is about 3,500 feet B. M. per acre, except on the red hills, where it is much less.

Demand.—The local demand is slight. In spite of the distance from the railroad there is fair demand for good shipping lumber.

Accessibility.—It is 12 miles from the nearest point on the creek across the top of the Cowee Mountains to Dillsboro, the nearest station on the Asheville and Murphy Branch of the Southern Railway.

Cutting.—There is no mill at present in operation, but many yards have been sawed, and the best timber has been culled.

Second growth.—Scarlet and black oaks, with pine, hickory, and chestnut, form the second growth on the lower hills. Oak and chestnut form the second growth in the mountains.

Undergrowth.—With the exception of groups of young trees and occasional clumps of *Kalmia* and other shrubs, underbrush is scant.

Reproduction.—Groves of young trees are frequent in culled woods, showing the readiness with which the forest will reproduce under suitable light conditions.

Rate of growth.—Except on dry soils, the rate of growth is generally good.

Water power.—The stream is too small to yield more than a very limited power. This is at present utilized in part by gristmills.

Ownership.—The forest land is largely owned by residents.

Occupancy.—The hills in the lower part of the basin are very largely under cultivation, and the slopes next to the stream, even where steep, are cleared to the head of the main stream, as are nearly all of the smaller tributary brooks.

Prices of land.—Woodland is valued at $2 to $3 per acre; farm land, at $3 to $50 per acre.

COWEE CREEK BASIN (MACON COUNTY, N. C.).

Area.—Total, 28 square miles; cleared, 6 square miles; wooded, 22 square miles; severely burned, none.

Surface.—The surface of the entire basin is rough. The area is fan-shaped and opens toward the south. At the north it is surrounded by the Alarka and Cowee mountains and is penetrated by lofty spurs. There is no bottom land, except on the lower part of the stream, and there is very little land with gentle slopes in the upper part of the valley.

Soils.—The soils are gray loose loams, derived from gneiss. They are rather coarse grained and are not very productive. On the mountains they are thin and wash badly. In the lower part of the valley they are fairly deep.

Humus and litter.—There is very little leaf mold, as the prevailing slopes are southerly and dry, and have, in addition, in many places been badly burned by ground fires.

Agricultural value.—Some of the land in the lower part of the basin is of good quality, though injudicious tillage and long cultivation have injured a great deal of it. The soils on the steeper slopes are generally too thin and sandy to yield heavy crops, but corn, small grain, and apples are all cultivated and do well. Some grass is grown, but the soils are too dry for good [illegible] lands.

Timber trees.—Oak and chestnut form the greater part of the [illegible]

drier soils. There is some yellow pine associated with the hardwoods in the lower part of the basin, and a very little hemlock, maple, and birch in the cool hollows in the upper part of the valley.

Yield.—The yield is about 2,500 feet B. M. per acre.

Demand.—There is a fair local demand for low-grade timber. There is no demand, however, for lumber for shipping. The best grades of timber have a local value of 50 cents to $1 per thousand feet on the stump.

Accessibility.—The valley is practically cut off from transportation facilities. The nearest railway point is Dillsboro, on the Asheville and Murphy Branch of the Southern Railway. It can be reached only by crossing the lofty range of the Cowee Mountains by a rough wagon road, by which it is 15 miles from the nearest point in the valley.

Cutting.—There are no mills at present cutting on the stream, except small water mills with a limited capacity, which are sawing for local use. The best poplar has already been removed and the greater part of the good oak.

Second growth.—Oak and chestnut sprouts form the greater part of the second growth. In the lower part of the basin there is some yellow pine in culled woods and a few thickets entirely of pine in waste land.

Undergrowth.—The forest is generally open, with the exception of occasional thickets of ivy or other shrubs and young trees. Where they have been badly burned recently brush is abundant.

Reproduction.—Most of the species reproduce well, though fires greatly check reproduction, especially on the drier slopes.

Rate of growth.—Accretion is normal for the aspect and elevation.

Water power.—The stream is too small to afford more than a limited power, but has ample fall.

Ownership.—The forest land is divided into small holdings in the possession of residents.

Occupancy.—The entire basin is thickly settled.

Prices of land.—Woodland sells at $1 to $3 per acre; farming land, at $5 to $10 per acre.

BRADLEY CREEK BASIN (MACON COUNTY, N. C.).

Area.—Total, 3 square miles; cleared, 1 square mile; wooded, 2 square miles; burned, none.

Surface.—Bradley Creek drains a small basin with a southwesterly slope. The upper portion of the basin lies on the steep slopes of the Alarka Mountains and is very rough; the lower part is gorge-like where the streams break through into Tennessee River.

Soils.—The soils are deep but generally coarse grained and are derived from gneiss and mica-schists. In spite of their steepness they do not wash very badly. They are not very productive and have not been carefully tended.

Humus and litter.—There is a deep accumulation of leaf mold on the north slopes and in the hollows, but much less on the south slopes, which have been badly burned.

Agricultural value.—Corn is the staple crop; small grain and apples are cultivated to some extent. The yields are not heavy and farming is not profitable. Many of the farms are too small to adequately support their owners.

Timber trees.—Oaks form about 50 per cent and chestnut about 25 per cent of the entire forest; sourwood and hickory are freely associated with these on southern slopes. In a few dry places there is some yellow pine, and in the hollows hemlock, birch, and maple are also found, with a small quantity of poplar and ash.

Yield.—The yield is about 2,000 feet B. M. per acre, except on the poorest ridge land, where it is much less.

Demand.—The local demand is limited to a small amount of low-grade wood for domestic use and chestnut and locust for fencing and posts. Some lumber has been sawed and hauled to Bryson City, but the distance is too far to make this profitable.

Cutting.—The best poplar and oak has been cut for shipment, and much of the low-grade timber for domestic use.

Second growth.—Oak and chestnut sprouts form the second growth. This is by no means abundant, as the area of heavily culled woodland is not large.

Undergrowth.—There are some laurel thickets on north slopes, but they are not large enough nor dense enough to interfere seriously with lumbering. There is very little ivy. In a few places there are thickets of shrubs and brush, which have followed fires.

Reproduction.—Most of the species reproduce well, both by seed and sprouts. The forest in many places is devoid of young growth because of frequent fires.

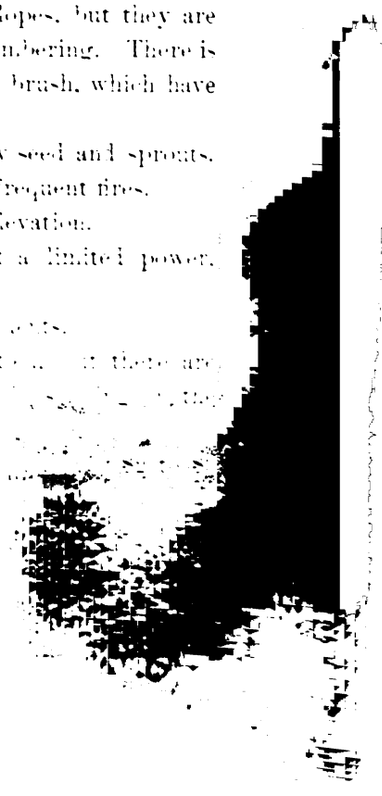
Rate of growth.—Accretion is normal for the aspect and elevation.

Water power.—The stream is too small to afford any but a limited power, although the fall is ample.

Ownership.—The forest land is held in small areas by residents.

Occupancy.—The upper part of the basin is thickly settled; in the lower part there are only a few farms in the lower part. There are about [illegible] creek.

Price of land.—Farming land sells at $5 to $20 per acre, [illegible] per acre.



LAKEY CREEK BASIN (MACON COUNTY, N. C.).

Area.—Total, 9 square miles; cleared, 2 square miles; wooded, 7 square miles; severely burned, slight.

Surface.—The surface of the basin is rough throughout. The lower part is hardly more than a gorge, and there is no bottom land on the creek. Most of the farms are in the upper part of the basin.

Soils.—The soils are gray loams and loose loams, derived from gneiss, and are not very deep, even on the most gentle slopes.

Humus and litter.—There is very little humus along crests and on southern slopes, but it has accumulated to a considerable depth in the deep hollows, except where they have been excessively pastured.

Agricultural value.—Corn is the staple crop. Some small grain and some apples are produced. Irish potatoes do well, and some grass is raised, especially on the north slopes at high elevations. The land is too rough, however, and the soils too sandy and thin to make agriculture profitable. The farms are small, in many cases too small to comfortably support those dependent upon them.

Timber trees.—Oaks form about 50 per cent of the forest, chestnut about 20 per cent, hemlock about 7 per cent, while birch, ash, poplar, and maple constitute the greater part of the rest.

Yield.—The yield is 2,000 feet B. M. or more per acre, except on the crests of the ridges.

Demand.—There is no local demand, except for low-grade lumber for domestic building, and chestnut and locust for fencing and posts. Some of the finest lumber has been sawed and hauled to Bryson City, but the distance is too great for this to be profitable.

Second growth.—The second growth is largely confined to the woodland adjoining farms, which has been extensively culled for farming uses, and consists largely of oak and chestnut sprouts, with, in some places, a considerable intermixture of sourwood.

Undergrowth.—There is very little *Kalmia* and rhododendron. In some places the woods are brushy where they have been burned.

Reproduction.—Most of the species reproduce well by seed and by stool sprouts from stumps of young trees after cutting or burning.

Rate of growth.—In the warm, moist hollows very good growth is made. Accretion is less rapid on the dryer slopes and at high elevations.

Water power.—The stream is too small to afford any power suitable for manufacturing purposes.

Ownership.—The forest land is held in small areas by residents.

Occupancy.—The upper part of the basin is thickly settled, there being 15

or more families on this part of the stream. There are very few in the lower part of the basin.

ALARKA CREEK BASIN (SWAIN COUNTY, N. C.).

Area.—Total, 38 square miles; cleared, 5 square miles; wooded, 33 square miles; severely burned, none.

Surface.—The entire basin is very rough. There are only a few small alluvial bottoms. The upper part lies on the steep and, in many places, very rough and rocky slopes of the Alarka and Cowee mountains. In the lower part there are some hills with more gentle slopes. Six miles from its head the creek is walled in by cliffs, so that no road can be built up it.

Soils.—The soils are gray loams and loose loams, derived from gneiss. In many places they are fairly deep; but they are generally shallow, especially on south sides, and are often very rocky.

Humus and litter.—Leaf mold is abundant on north slopes in the hollows. South slopes have been badly burned, however, and there is very scant humus.

Agricultural value.—Corn and grass are crops commonly cultivated. Some oats are grown and a small amount of wheat. The soils, however, are not productive, and farming is carried on at a great disadvantage.

Timber trees.—The oaks form about 45 per cent; chestnut, 35 per cent; linn and buckeyes, about 5 per cent, and birch 2 per cent of the forest. There is very little poplar. The best oak and ash have been cut.

Yield.—The merchantable timber is confined to the head of the creek. The yield is less than 3,000 feet B. M. per acre.

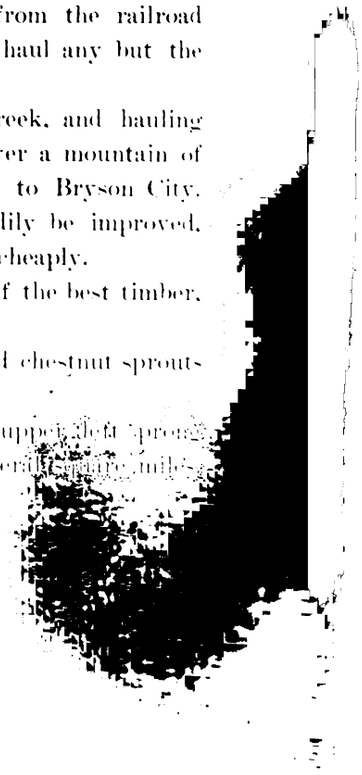
Demand.—There is no local demand, and the distance from the railroad renders it unprofitable to cut any but the best timber and to haul any but the best lumber.

Accessibility.—There is no road all the way down the creek, and hauling from the head of the creek to Bryson City must be done over a mountain of some size. It is 15 miles from the upper part of the basin to Bryson City. The road is in very bad condition, but parts of it could readily be improved, and a new one, much better graded, could be built easily and cheaply.

Cutting.—No mills are at present in operation. Nearly all of the best timber, except at the head of the creek, has been logged.

Second growth.—Second growth is largely limited to oak and chestnut sprouts on burned land and the culled woodland adjacent to the farms.

Undergrowth.—There is scant underwood, except on the upper left prong of the creek, where there is a dense laurel thicket covering several square miles.



Rate of growth.—Accretion is generally good, except on dry and steep slopes, or at high elevations, where there is a coarse, thin, sandy soil.

Water power.—The stream is too small to afford more than a small power. Several gristmills are at present utilizing a portion of it.

Ownership.—The timber land is largely owned by residents. There are only a few tracts of more than 1,000 acres. These lie at the upper part of the creek on the north side of the Cowee and south side of the Alarka mountains.

Occupancy.—There are about 50 families living on the stream.

Prices of land.—Farming land sells at $6 to $20 per acre; woodland, at $2 to $4.

GRASSY CAMP AND NORTON CREEK BASINS (JACKSON COUNTY, N. C.).

Area.—Total, 6 square miles; cleared, 1 square mile; wooded, 5 square miles.

Surface.—The greater part of the area is rolling or cut up by numerous streams into hills with gentle slopes. The Cowee Mountains, however, lie at the head of Norton Creek, and with their northern spurs, which are steep, makes the topography very rugged.

Soil.—In the upper part of both basins the soil is a coarse, sandy loam, often gravelly and shallow, and closely underlain by the granite from which it is derived. In the lower part of the valleys the soils are gray loams, often very sandy, derived from gneiss, or from a coarse granite similar to that at the heads of the streams, but are deeper and more largely the result of washing.

Humus and litter.—On the steeper slopes the accumulated leaf mold is scant because of repeated fires. There is more or less humus in all the deep hollows, and in hemlock forests where fires seldom or never occur.

Agriculture value.—The upper parts of the basins lie at an elevation of from 3,500 to 4,000 feet, with a generally northwestern exposure, and are too cold for any but the hardiest crops. Grasses do well where the soils are sufficiently fine grained to preclude drying. Yellow corn in many places is successfully raised; neither wheat nor oats, however, do so well. The hardier varieties of apples are grown.

Timber trees.—Scarlet oak, white oak, chestnut, black oak, white hickory, red hickory, and sand hickory, with occasional yellow pines, form the dominant growth on all the steeper and drier slopes. On north slopes, birch, maple, and occasional ash are associated with the chestnut and oaks. Narrow groves of hemlock form the forests bordering some of the streams in the colder valleys, and there are occasional white pines on lower slopes and along the borders of the streams.

Yield.—The hemlock forests along the alluvial lands will yield from 5,000 to

12,000 feet B. M. of merchantable timber per acre, and about 15 cords of hemlock bark. The slopes and crests are scantily timbered and will not cut more than 500 to 1,000 feet B. M. per acre, and yield in addition from 10 to 15 cords of small wood.

Demand.—There is at present slight demand for timber, there being no local building and no available market for shipping. Common stumpage sells at from 50 cents to $1 per thousand feet, but good grades of timber bring more. Only the choicest logs of white pine, yellow poplar, and oak are cut.

Accessibility.—The distance from the nearest point on these streams to Dillsboro, on the Asheville and Murphy Branch of the Southern Railway, is about 22 miles. The wagon road, however, is good, except in a few places, and there are not many hills.

Cutting.—Much of the best timber on the lower part of Norton Creek has been cut and floated down Cullasagee River to the mills at Dillsboro. The cost of floating was found to be too great, however, as the bed of the stream is very rocky, and many men were required to prevent the formation of jams. There is at present no mill on either creek cutting timber for shipment.

Fire.—The upper slopes of Shortoff Mountain, Yellow Mountain, and all the higher surrounding ridges are badly burned. Frequent fires consume the brush and litter in nearly all of the hard-wood forests, which are thin and open on this account.

Reproduction.—Scarlet oak, chestnut, white oak, and sourwood reproduce abundantly on burned land from stool shoots. These species also seem to seed frequently and germinate freely, even in the most exposed situations and on the poorest soils.

Second growth.—The undergrowth of young trees of the dominant species is generally scant, because of the fires. In localities where there have been no fires in several years there are masses of vigorous stool shoots, chiefly of chestnut, scarlet oak, and sourwood, but in most places there is very little second growth. One or two small fields which have been abandoned support thickets of vigorous white pine.

Undergrowth.—Beneath the hemlock forests there is a dense undergrowth of laurel and *Kalmia*, but the rest of the forest is generally open.

Rate of growth.—On account of the high altitude and the poor soil, growth is slow. Hemlocks 200 years old do not average more than 2 feet in diameter, breast high, and 100 feet in height. The growth of hard-wood seedlings is also slow. Chestnuts 100 years old are not more than 18 inches in diameter and 60 feet in height. On account of the openness of the forest, which is due to the

A. CUTTING WHITE-PINE TIMBER, SHADY VALLEY, TENNESSEE.

B. DESTRUCTION OF FOREST ON MOUNTAIN RIDGE FOR PASTURAGE PURPOSES.

frequently recurring fires, most of the trees are short-bodied and have large, spreading crowns.

Water power.—There is one small gristmill in operation on Norton Creek, and there are other sites for small mills. The power available, however, is not large.

Ownership.—The forest land is largely owned by residents. There are 3 families on Grassy Camp Creek and 16 on Norton Creek.

Prices of land.—Land suitable for farming sells at $4 to $10 per acre. There is considerable land at present in timber, with gentle slope and well situated for farming, especially for grass, though thin-soiled and light. Woodland sells at $1 to $4 per acre.

SAVANNAH CREEK BASIN (JACKSON COUNTY, N. C.).

Area.—Total, 41 square miles; cleared, 9 square miles; wooded, 32 square miles; burned, none.

Surface.—In the upper part of the basin is a series of deep, narrow, nearly parallel gorges opening to the north and northwest, indenting the northern slope of the Cowee Mountains. In the lower part of the basin are broader valleys, with some level bottoms adjoining the stream and rolling uplands, which descend gently from the surrounding foothills.

Soil.—The soils of the mountains and of the upper part of the basin are gray, sandy, and loose loams derived from gneiss. In spite of their rockiness they are generally deep and fairly productive. The soils of the lower part of the basin are red, stiff loams, very deep, but often wash badly when cleared, if not carefully cultivated.

Humus and litter.—There is only a slight accumulation of forest litter on the hills and the drier soils, but in the deep gorges and coves at the heads of the streams there is much humus.

Agricultural value.—The gray lands at the head of the stream are very good grass lands and produce fair crops of corn. The red lands in the lower part of the basin yield well in corn and small grain, pease, and clover, but will not remain for a long while set in grass. The bottom lands are all productive. Apples do well and are grown on a commercial scale.

Timber trees.—Oak forms about 45 per cent of the forest; chestnut about 35 per cent; in the mountains maple, birch, linn, buckeye, and poplar, with some hemlock form the remainder. On the lower hills hickory and yellow pine are associated with the oaks and chestnut.

Yield.—There is very little merchantable timber in the lower half of the

basin. The yield in the upper part will not be more than 3,000 feet B. M. per acre.

Demand.—On account of the nearness to the railroad there is great demand for good lumber suitable for shipping. There is also some local demand for pit posts for mining and for common lumber for domestic building and fencing. Tan bark brings good prices. Locust and oak stock for insulator pins and railroad ties are being bought. Some chestnut telegraph poles have been cut, and it is probable that in a few years the demand will increase greatly.

Accessibility.—The headwaters of the creek are only about 12 miles from Dillsboro, on the Asheville and Murphy Branch of the Southern Railway. The wagon road down the creek is in fair condition, and there are no long, steep hills.

Cutting.—Two mills are at present cutting on the stream. The best of the merchantable timber, except on some small holdings which are being reserved, has been cut.

Second growth.—Oak sprouts form the characteristic growth on cut-over lands. In the lower part of the basin, scrub, yellow, and black pines form much of the second growth in culled woods and in old fields.

Undergrowth.—There is very little underbrush, except thickets of young trees in culled woods.

Reproduction.—The hard woods reproduce freely by stool shoots, and numerous thickets of seedlings in culled woods show that the forest will respond gratefully to careful treatment.

Rate of growth.—Accretion is generally rapid, unless the soils are sterile, as is the case over a few limited areas on the red hills.

Water power.—There is ample fall in the stream, but the amount of water is too small to yield more than a limited power. This is being utilized to some extent by several small mills.

Ownership.—The forest land is largely held in small areas by residents. There is only one tract of more than 1,000 acres in the basin.

Occupancy.—The valley is well settled, and there are probably more than 100 families living in it.

Prices of land.—Woodland sells at $2 to $4 per acre; farming land, at $5 to $100 per acre.

CULLOWEE RIVER BASIN (JACKSON COUNTY, N. C.).

Area.—Total, 28 square miles; cleared, 6 square miles; wooded, 22 square miles; burned, none.

Surface.—In the lower part of the basin are low, rounded hills, with [illegible] mountains beyond them. The upper part is a series of long, narrow [illegible] valleys with very steep slopes.

Soils.—The soils are rather coarse-grained loams and sandy loams, usually gray, derived from gneiss, mica-schists, and metamorphosed sandstones. The soils of the red clay hills in the lower part of the valley are generally loams or stiff loams. The soils of the mountains are thin and often rocky; those of the red hills are deep and free from stones.

Humus and litter.—There is an excellent ground cover in all the deep north hollows which lie at the head of the stream.

Agricultural value.—The alluvial lands and the red hills are very productive and are in an excellent state of cultivation. The steep mountain slopes are less productive and are not so carefully tended, and in some places have washed badly.

Timber trees.—The oaks form about 45 per cent of the forest; chestnut about 35 per cent. The remainder is largely composed of birch, ash, maple, hickory, hemlock, and yellow poplar, in the order named.

Yield.—Except in the lower hills, which are lightly timbered with oak and chestnut, largely second growth, the basin is heavily wooded and will cut from 2,500 to 3,500 feet B. M. per acre.

Demand.—Good grades of lumber are in active demand. A small mill is at present cutting on the creek. Bark of both hemlock and chestnut oak is being bought for local tanneries.

Accessibility.—It is about 8 miles, over a good road, from the mouth of the creek to Dillsboro, the nearest railroad station on the Southern Railway.

Cutting.—One small sawmill is at present in operation, but the best timber has already been cut. There is, however, at the head of the basin some very good oak and maple yet standing.

Reproduction.—The dominant trees reproduce well wherever the proper light conditions are afforded.

Second growth.—Young timber is generally scant in the forest, except where breaks have been made in the cover, either by lumbering or by fires. Many of the living trees show traces of injury by ancient fires.

Undergrowth.—The forests are generally open, except for the groves of young trees and occasional thickets of laurel.

Rate of growth.—Accretion is good, except at high elevations and on very dry slopes.

Water power.—The upper part of the stream is very rapid and sites for dams are numerous. The lower part is not so rapid, but there are several places where low dams could be built. A few small water mills are at present using part of the power.

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Ownership.—The greater portion of the timber is at present owned by residents.

Prices of land.—Agricultural lands sell at $5 to $50 per acre. Forest lands, in the mountains, sell at $2 to $4 per acre.

EAST FORK OF TUCKASEGEE RIVER BASIN (JACKSON COUNTY, N. C.).

Area.—Total, 89 square miles; cleared, 10 square miles; wooded, 79 square miles.

Surface.—The greater part of the surface is extremely rough and rugged, especially on the northern slopes of Bell Coney Mountain and Big Ridge and on the southern slopes of the Balsam Mountains.

Soils.—The soils of the valleys of the northern tributaries are gray, loose loams, sometimes fine grained, but generally coarse, and in many places gravelly, often rocky. They are derived in large part from metamorphosed sandstones. The soils of the watersheds of the southern tributaries are coarse, sandy, or gravelly loams, derived in large part from a coarse granite. They are very thin and porous, and are apt to dry out during prolonged droughts.

Agricultural value.—In the lower part of the basin, especially on Gladie and Sol creeks, there are some limited areas of very good soil, and nearly all of the staple agricultural crops are successfully and profitably raised. On Wolf and Tennessee creeks the land is too steep and the soil too thin for agriculture to be profitable, although there are many small farms. The elevated region at the head of the southern tributaries, lying along the crest of the Blue Ridge, is too cold for successful farming, grass and hardy apples alone being considered profitable crops.

Humus and litter.—A great portion of the south-side land, lying on Wolf and Tennessee creeks, has been very badly burned and the humus destroyed or very much reduced. Elsewhere, except on badly burned land, there is much more humus. It is generally thin, however, on the elevated land lying along the Blue Ridge.

Timber trees.—Oak forms about 45 per cent of the forest and chestnut about 30 per cent. On nearly all the streams are some fine groups of hemlock, and in the hollows are small quantities of poplar, ash, birch, and buckeye. There is some white pine, especially on the southern tributaries, but the stand is not heavy.

Yield.—The average yield is about 2,500 feet B. M. per acre.

Demand.—At present there is no demand for any kind of lumber, on account of the lack of transportation facilities.

Cutting.—There are no mills at present in operation. Little cutting has

ever been done, except for local use, although an attempt was made to float timber from some of the lower tributaries to Dillsboro. This, however, was abandoned.

Second growth.—Second growth in most places is scant and is largely formed of stool shoots of small white oak and chestnut oak, chestnut, and sourwood on burned land. There is some young white pine which has appeared in open places.

Undergrowth.—There are dense thickets of laurel along nearly all of the streams and some thickets on south slopes. In many places the forest is brushy with stool shoots which have followed fires.

Rate of growth.—The trees grow slowly and only under the best conditions attain a large size. Along the Blue Ridge hemlocks 300 years old barely scale 100 feet, and oak and chestnut both show the result of the adverse conditions. In the warm, southern hollows, where the soil is better, a far more rapid rate of accretion is shown.

Water power.—There are many small falls which could furnish power for manufacturing plants and a few places are suitable for the erection of high dams. The stream is not large enough, however, to yield more than 5 horsepower per foot fall. This, possibly, is somewhat offset by the constancy of its flow.

Ownership.—In the lower part of the basin the land is divided into small holdings in the possession of residents.

Prices of land.—Farming land sells at $4 to $15 per acre; woodland, at $1 to $4 per acre. The greater part of the land suitable for agriculture is at present in cultivation.

CULLASAGEE RIVER BASIN FROM FRANKLIN TO THE MOUTH OF BUCK CREEK (MACON COUNTY, N. C.).

Area.—Total, 40 square miles; cleared, 12 square miles; wooded, 28 square miles.

Surface.—For 6 miles above Franklin the basin is a broad valley with wide alluvial lands bordering the river. Beyond the alluvial lands are low, rounded hills, the flanks of which become steeper, both to the north and to the south, as the mountains are neared. From 6 miles above Franklin to the mouth of Buck Creek the valley gradually narrows. There is very little bottom land, the country becomes rough, especially on the north side of the river, where for several miles below the mouth of Buck Creek there are high bluffs, the country beyond being cut into a series of deep, narrow valleys, which are separated by ridges with steep slopes and drained by several small streams.

Soil.—The alluvial lands have a deep, fine-grained, silty or loamy soil, largely mixed with organic matter, and are largely cleared and under cultivation. They

of the Cheoah Mountains are deeper, and nearly all of the ridge land in cultivation is on this slope.

Humus and litter.—There is scant humus on the south side of Yellow Creek Mountain; on the north side of the Cheoah Mountains it is much deeper and generally in good condition.

Agricultural value.—The alluvial lands are not fertile; they are mucky in part and do not even produce good grass. Most of the corn is produced on the slopes. Corn, grass, and some fruit are raised.

Timber trees.—Oaks, chestnut, and hickory, with some yellow pine, form the prevailing growth.

Yield.—There is very little merchantable timber on the south slope of Yellow Creek Mountain. The north slope of the Cheoah Mountains will cut less than 2,000 feet B. M., largely oak, per acre.

Demand.—There is no local demand, except for chestnut for domestic use. On account of the distance to Bushnell, the nearest shipping point, only the best timber can be cut with profit.

Accessibility.—A rough road leads from the Tuskeegee Gap to Bushnell, about 17 miles distant.

Cutting.—Two mills are at present cutting on the creek, with a combined capacity of about 25,000 feet a day. The best timber has already been cut from the north slope of the Cheoah Mountains, where at one time there was some excellent yellow poplar and linn.

Second growth.—There is a small amount of second growth, generally hardwood sprouts, in the farm woodland, and some second-growth yellow pine.

Undergrowth.—The woods are generally open, except where there are occasionally thickets of *Kalmia* or other shrubs, or where badly or frequently burned thickets of sprouts spring up from the stools of young trees.

Reproduction.—Reproduction is good on the north slopes of the Cheoah Mountains. It is scanty, however, on the dry and frequently burned south side of Yellow Creek Mountain.

Rate of growth.—Accretion is rapid on moist, deep soils, but slow on dry, thin ones.

Water power.—The stream has ample fall in the lower part of its course after it enters the gorge, and one gristmill is at present using a part of this power.

Ownership.—There are 37 families on the stream, who own the greater part of the forest land.

Prices of land.—Agricultural land sells at $6 to $15 per acre; timber land, at $3 to $5 per acre.

and such a road would do much to facilitate the exploitation of the timber of Macon County.

Cutting.—There are several small portable mills at present cutting timber on this part of the river, near Cullasagee. Their combined capacity is not more than 25,000 feet a day. Much timber is used locally in building and maintaining fences and for farm use. The corundum works, likewise, require a considerable amount of timber.

Fire.—Some steep south slopes are frequently badly burned and most of the undergrowth and young seedlings killed or reduced to stool shoots.

Reproduction.—The stumps of nearly all of the broadleaf species sprout, unless the trees are too old, and much of the second-growth wood is formed of stool shoots; but seedlings are abundant wherever light conditions are favorable.

Second growth.—In culled woods that are not frequently burned nor too severely pastured there are many vigorous young trees and saplings.

Undergrowth.—Undergrowth is wanting in most of the second-growth woods attached to the farms, but there are many places in the larger forest areas where there is a dense undergrowth of *Kalmia* and bush honeysuckle.

Rate of growth.—Excellent growth is made on all the alluvial lands and the lower hills, especially on north slopes.

Water power.—There are several sites where excellent water power is available. Some is at present being utilized.

Ownership.—The forest is largely divided into small holdings, much of it attached to farms. There are about 95 families within the area.

Prices of land.—The alluvial lands sell at $40 to $50 per acre; the uplands, suitable for farming, at $5 to $20 per acre; timber lands, at $1 to $5 per acre.

YELLOW CREEK BASIN (GRAHAM COUNTY, N. C.).

Area.—Total, 13 square miles; cleared, 2 square miles; wooded, 11 square miles; severely burned, 2 square miles.

Surface.—The creek drains a narrow basin from 1 to 3 miles wide between Yellow Creek Mountain and the Cheoah Mountains. There are a few narrow bottoms; one near the head of the creek, about one-fourth mile wide, contains several hundred acres. The lower part of the creek passes through a gorge. The mountain slopes rise from the bank of the stream or the borders of the alluvial land, and are generally steep.

Soils.—The upland soils are loose and rather coarse grained and are not fertile. Those on the south side of Yellow Creek Mountain are thin, gravelly, and often encumbered by massive fragments of rock. Those on the north side

OTTER CREEK BASIN (MACON COUNTY, N. C.).

Area.—Total, 10 square miles; cleared, 2 square miles; wooded, 8 square miles; severely burned, very little.

Surface.—The greater part of the valley is rough, the slopes being steep and rocky. There is very little alluvial bottom land.

Soil.—The soils are gray loams, generally deep and fine grained, derived from pyrophyllite and mica schists. On steep slopes they wash badly when cleared, unless kept in grass.

Humus and litter.—Leaf mold is scant on south slopes. The ground is well protected, however, on north slopes and in deep hollows. Around the farms litter is regularly removed from the forests for cattle bedding and as a mulch for crops.

Agricultural value.—Grass, corn, and some of the small grains, especially rye, apples, and potatoes, are the chief crops.

Timber trees.—On south slopes the forest is largely composed of scarlet oak, chestnut, and white oak, associated with black oak, hickories, and occasional black gum. Scarlet oak and chestnut form about 60 per cent of the growth. On north slopes and in the hollows the growth is largely chestnut, white oak, red oak, and maple, with occasional poplar, birch, and ash. The best chestnut, poplar, and ash have been removed.

Yield.—South sides and crests will cut about 1,000 feet of merchantable timber, largely low grade, per acre; north slopes and hollows from 3,000 to 4,000 feet per acre. In addition to this there are about 30 cords of small wood per acre.

Demand.—Poplar, oak, and ash stumpage sells at 50 cents to $2 per thousand feet, according to quality and situation.

Accessibility.—Roads can easily be made to timber in any part of the valley. At high water timber can be splashed into the river. It is 7 miles, by the wagon road up Partridge Creek, to Jarrett, a station on the Asheville and Murphy Branch of the Southern Railway.

Cutting.—Much of the best poplar, ash, and oak, and all of the cherry has been cut and either sawed locally by small mills and hauled by wagon to Jarrett or floated down the river to Nantahala. There are two small upright sawmills at present cutting timber, and a small wagon factory.

Fire.—Timber on south slopes has been much injured by repeated ground fires, and much of the timber is stool shoots from this cause.

Reproduction.—Sourwood, oak, and chestnut reproduce well from seed, other species apparently not so freely. The chestnut, sourwood, and oak sprout freely from the stump while young, when fire killed or cut.

Second growth.—The second growth is largely of scarlet and white oaks, and consists chiefly of stool shoots. There are often several sprouts from the same stump. Fires and cattle suppress much of the second growth on south slopes. On north slopes there are occasional thickets of saplings of red oak, chestnut, and ash which have sprung up where poplar and chestnut have been culled.

Undergrowth.—Huckleberry and bush honeysuckle form most of the undergrowth on south slopes, and laurel and *Kalmia* on north slopes and in the hollows. North slopes, however, are generally free from undergrowth.

Rate of growth.—Trees grow rapidly, especially young trees which are not too crowded, as those on cut-over lands and in culled woods. The growth on the dry southern slopes is slower and the trees smaller.

Water power.—There are two small mills on the creek operated by water power and there are sites for other mills, but the power is not great.

Ownership.—The lower part is owned by residents.

Prices of land.—Agricultural land in cultivation sells at $5 to $7 per acre; timbered lands, at $2 to $3 per acre.

WINE SPRING CREEK BASIN (MACON COUNTY, N. C.).

Area.—Total, 7 square miles; cleared, 1 square mile; wooded, 6 square miles; severely burned, none.

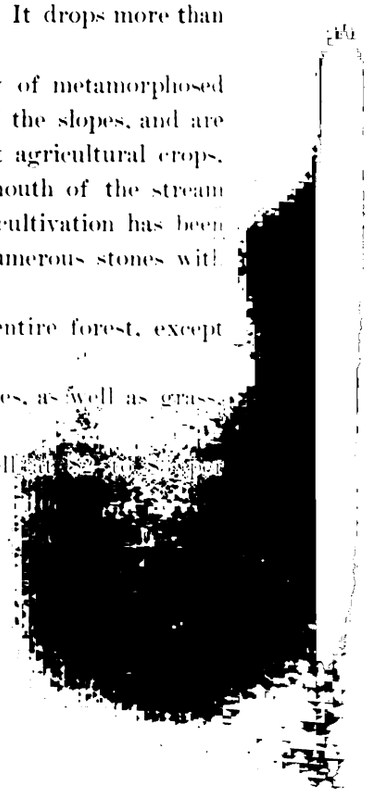
Surface.—One-half mile above its mouth the valley narrows abruptly into a gorge, which extends to the head of the creek. The slopes are very steep and rocky, and there is no level bottom land. The descent of the stream is very rapid, being a series of falls and rapids nearly to its mouth. It drops more than 1,000 feet in less than 3 miles.

Soil.—The soils are gray loams, derived from the decay of metamorphosed sandstones. They are fairly deep in spite of the steepness of the slopes, and are well adapted to forest growth. They are too sandy for most agricultural crops, and, on account of their steepness, wash rapidly. At the mouth of the stream is a small alluvial bottom. It has been cleared, but its cultivation has been abandoned on account of the lightness of the soil and the numerous stones with which it is encumbered.

Humus and litter.—There is excellent leaf mold in the entire forest, except on some of the steepest southern slopes and driest crests.

Agricultural value.—Corn, small grain, apples, and potatoes, as well as grass, do well in spite of the steepness of the land.

Demand.—Poplar, ash, and oak are sought for and sell [illegible] thousand feet on the stump.



and such a road would do much to facilitate the exploitation of the timber of Macon County.

Cutting.—There are several small portable mills at present cutting timber on this part of the river, near Cullasagee. Their combined capacity is not more than 25,000 feet a day. Much timber is used locally in building and maintaining fences and for farm use. The corundum works, likewise, require a considerable amount of timber.

Fire.—Some steep south slopes are frequently badly burned and most of the undergrowth and young seedlings killed or reduced to stool shoots.

Reproduction.—The stumps of nearly all of the broadleaf species sprout, unless the trees are too old, and much of the second-growth wood is formed of stool shoots; but seedlings are abundant wherever light conditions are favorable.

Second growth.—In culled woods that are not frequently burned nor too severely pastured there are many vigorous young trees and saplings.

Undergrowth.—Undergrowth is wanting in most of the second-growth woods attached to the farms, but there are many places in the larger forest areas where there is a dense undergrowth of *Kalmia* and bush honeysuckle.

Rate of growth.—Excellent growth is made on all the alluvial lands and the lower hills, especially on north slopes.

Water power.—There are several sites where excellent water power is available. Some is at present being utilized.

Ownership.—The forest is largely divided into small holdings, much of it attached to farms. There are about 95 families within the area.

Prices of land.—The alluvial lands sell at $40 to $50 per acre; the uplands, suitable for farming, at $5 to $20 per acre; timber lands, at $1 to $5 per acre.

YELLOW CREEK BASIN (GRAHAM COUNTY, N. C.).

Area.—Total, 13 square miles; cleared, 2 square miles; wooded, 11 square miles; severely burned, 2 square miles.

Surface.—The creek drains a narrow basin from 1 to 3 miles wide between Yellow Creek Mountain and the Cheoah Mountains. There are a few narrow bottoms; one near the head of the creek, about one-fourth mile wide, contains several hundred acres. The lower part of the creek passes through a gorge. The mountain slopes rise from the bank of the stream or the borders of the alluvial land, and are generally steep.

Soils.—The upland soils are loose and rather coarse grained and are not fertile. Those on the south side of Yellow Creek Mountain are thin, gravelly, and often encumbered by massive fragments of rock. Those on the north side

Ownership.—The lower portion is owned by residents. There are only 2 families on the creek, and the clearings extend only a quarter of a mile above the mouth.

JARRETT CREEK BASIN (MACON COUNTY, N. C.).

Area.—Total, 6 square miles; cleared, 1 square mile; wooded, 5 square miles; severely burned, very little.

Surface.—The basin along the lower 3 miles of the creek is a narrow valley, walled in by high and steep slopes; above it broadens out with some rolling land and gentle slopes beyond the alluvial bottoms, and this character of country extends to the head of the stream. One mile above the mouth there are limited alluvial bottoms. The fall of the creek is very rapid for the first 3 miles; above that it is more gentle. The mountain slopes of the lower valley are rough and rocky and offer few situations for further clearing. There are probably 200 acres, however, on the rolling land near and at the head of the creek, suitable for cultivation.

Soil.—The soil of the lower valley is a gray loam, occasionally loose, but often rocky, derived from metamorphosed sandstone. That of the upper valley is sandy, derived in part from granite and gneiss.

Humus and litter.—On the north slopes there is a deep accumulation of leaves and litter. It is often thin on steep south slopes, particularly in the upper part of the basin, or where there have been fires. In many places there is much grass.

Agricultural value.—The land is fairly productive. Corn, small grain, tobacco, apples, potatoes, and grass are the chief crops. Howard, pippin, baldwin, winesap, and buff apples all do well.

Timber trees.—Scarlet oak, chestnut, white oak, black oak, hemlock, birch, ash, and an occasional poplar, in relative abundance about in the order named, compose the greater part of the forest. On the south sides and on the crests of ridges there is some chestnut oak. The scarlet oak forms about 30 per cent of the stand, chestnut about 30 per cent, white oak and black oak about 10 per cent each. Hemlock is for the most part confined to the banks of the streams and to deep, north hollows.

Yield.—The forest will cut from 2,000 to 3,000 feet B. M. per acre. It will yield somewhat more than this in the heavily wooded north coves, while on the steep southern slopes and ridges the cut will be less than 1,000 feet per acre, the greater part being red oak and chestnut timber of low grade. In addition to the milling timber there are about 30 cords of small wood [illegible] acre and about one-half cord of oak and hemlock tan bark per acre. The forest [illegible] lower valley have been much culled for domestic use and all [illegible] merchantable

milling timber has been removed for a mile above the mouth of the creek. No cutting or culling has been done in the upper valley.

Demand.—Oak, yellow poplar, linn, and ash are the species sought.

Accessibility.—The mouth of the creek is 13 miles from Andrews, on the Asheville and Murphy Branch of the Southern Railway, the wagon road crossing the Valley River Mountains. It is 11 miles down the river to Nantahala, where the mills of the Nantahala Lumber Company are situated. The river will float logs, except at very low water.

Cutting.—There is no mill in operation on the creek. The timber has been cut, however, for a mile above the mouth of the creek and floated down Nantahala River, into which the creek empties, to the mills of the Nantahala Lumber Company. All merchantable timber—oak, chestnut, poplar, birch, linn, and ash—above 10 inches in diameter have been cut.

Fire.—There is much badly burned land on the steep southern slopes, especially near the head of the creek. The leaves, dried grass, and brush are purposely burned about every two years to keep the woods open and improve the grazing. It is thought also that burning the dead leaves tends to prevent the cattle disease known throughout the Southern Appalachians as milk sickness, which is probably caused by the cattle eating some poisonous plant.

Reproduction.—The young growth on burns and cuttings is largely white oak and scarlet oak seedlings, and oak and chestnut sprouts. In the coves and on shady slopes birch, yellow poplar, ash, and red oak seedlings are frequent.

Second growth.—In old fields and on north slopes birch, ash, and maple seedlings form the growth. There is no pine. There are very few saplings and seedlings, as they are suppressed by browsing cattle and ground fires.

Undergrowth.—The woods are largely open. *Kalmia*, huckleberries, bush honeysuckle, and brambles form occasional thickets.

Rate of growth.—Good growth is made by vigorous young trees, except on dry south slopes and along ridges, where the trees attain only a small size.

Water power.—There is ample fall in the stream and available sites for mills, but the power which could be secured would not be large, as the total length of the stream is only 7 miles and there are no large tributaries.

Ownership.—The lower part is divided into small holdings, largely held by residents. There are 7 families on the stream.

Prices of land.—Timbered lands sell at $3 to $4 an acre, while farming lands sell at $6 to $15 an acre. There is a strong sentiment in favor of the removal of the timber from the land in the upper valley, so that this land may be open to purchase for farming purposes.

CHOGEE CREEK BASIN (MACON COUNTY, N. C.).

Area.—Total, 15 square miles; cleared, 1 square mile; wooded, 14 square miles; severely burned, none.

Surface.—This stream drains a fan-shaped basin sloping toward the north. The upper part of the basin, on the slopes of the Valley River Mountains, is very rough and steep, but in the lower part there are gentle slopes and the land is not so rocky.

Humus and litter.—There is a good bed of leaf mold in nearly the entire forest, except along the crests and on the steepest southern slopes.

Agricultural value.—The soils in the lower valley are of good quality and produce well in corn, small grain, fruit, and potatoes. The steeper slopes are not suited for tillage, but make good grass lands.

Soil.—The soils are loams and loose loams, occasionally stiff, derived in large part from metamorphosed sandstone. They are often rocky, and on the steeper slopes are apt to wash when denuded.

Timber trees.—Chestnut, scarlet oak, white oak, hemlock, birch, hickory, ash, poplar, and linn, in relative abundance about in the order named, compose the greater part of the forest. The hemlock forms a compact forest of about 400 acres on the upper waters of the creek. About one-third of the standing hardwood timber is chestnut and about 20 per cent is scarlet oak.

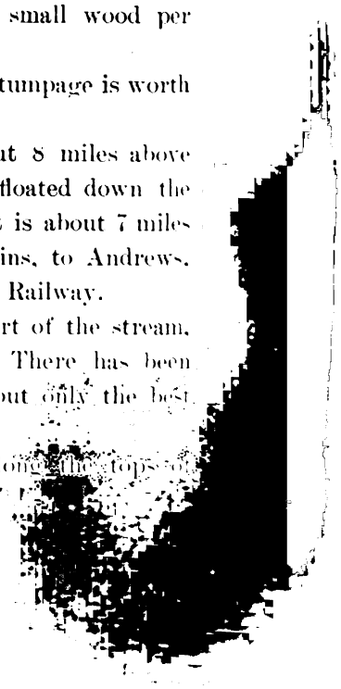
Yield.—The hemlock forest will cut from 8,000 to 10,000 feet B. M. per acre, and yield besides about 10 cords of tan bark. The hard woods will cut from 3,000 to 4,000 feet B. M. per acre, except in the very lowest part of the valley, where the greater part of the merchantable timber has been cut. In addition to the milling timber there is from 30 to 40 cords of small wood per acre.

Demand.—Good oak, ash, poplar, and linn are sought for. Stumpage is worth from $2 to $3 per thousand feet.

Accessibility.—The creek empties into Nantahala River about 8 miles above the mill of the Nantahala Lumber Company, and logs can be floated down the river to this mill or to the station of the Southern Railway. It is about 7 miles from the head of the creek, across the Valley River Mountains, to Andrews, a station on the Asheville and Murphy Branch of the Southern Railway.

Cutting.—Considerable timber has been cut on the lower part of the stream, chiefly oak, poplar, ash, and linn, and floated down the river. There has been culling on some of the land in the upper part of the basin, but only the best trees have been cut. No tan bark has been stripped.

Fire.—There have been no fires in recent years, except along the tops of the ridges or on dry slopes.



Reproduction.—Most of the hard woods reproduce freely and young seedlings are abundant wherever the light conditions are suitable. Small trees of oak and ash and larger ones of chestnut sprout from the stump after cutting. Many hemlock seedlings are to be seen on logs and in the moss in the hemlock forest. These will soon die, however, for want of light.

Second growth.—In many places where the forest has been culled there are thickets of thrifty saplings of oak, ash, poplar, and birch which will take the place of the mature timber as it is cut.

Undergrowth.—In many places, especially on damp north slopes, under hemlock, birch, and red oak, there is a growth of laurel.

Rate of growth.—Accretion is good, especially of vigorous young trees and in culled and cut-over woodland. It is very slow in old hemlocks and in timber on the upper slopes and crests.

Water power.—The amount of available power is limited.

Ownership.—The lower part of the basin and the prong known as Little Chogee are owned by resident citizens. There are 13 families on the creek.

Prices of land.—Forest land sells at $2 to $4 an acre; farming land, at $5 to $20 an acre.

BURNINGTOWN CREEK BASIN (MACON COUNTY, N. C.).

Area.—Total, 25 square miles; cleared, 4 square miles; wooded, 21 square miles; severely burned, small.

Surface.—The surface of the lower part of the basin is low, rounded hills, broken in places by low mountains; above it is a long, narrow valley, between mountains with steep slopes. There are few large tributaries to the main stream. The creek heads in the Burningtown Mountains and flows north into Tennessee River. The basin is about 12 miles long.

Soil.—The soil is of fine-grained loams and sandy loams, usually gray, over limited areas, derived from metamorphosed sandstone, quartzite, pyrophillite, and mica schist. Much of it is badly worn from long cultivation, and it is often thin and gullied on steep slopes. About one-fourth of the cultivated area is alluvial.

Humus and litter.—The leaf mold is thin or entirely wanting on south slopes and on the lower hills. There is an excellent ground cover, however, on most of the north slopes and in the hollows, especially at high elevations.

Agricultural value.—The sandy bottom lands produce well in corn, grass, and small grain, where they are not too thoroughly drained. Some upland farms at a low elevation have been abandoned, and the old fields are thickly set in broom grass, which has also sodded many of the sandier bottoms. Apples do well at a

high elevation, but they have been abandoned as a commercial crop, below 3,000 feet elevation, as the fruit no longer attains perfection.

Timber trees.—Chestnut, scarlet oak, white oak, black pine, red oak, poplar, birch, and ash, with occasional hemlock, hickory, and black oak form the greater part of the forest. The red oak, poplar, birch, ash, and hemlock are confined to the hollows and cooler elevated slopes. Chestnut, scarlet oak, white oak, and yellow pines form more than three-fourths of the forest. Pine is chiefly found below 3,000 feet elevation, where it is associated with scarlet oak, black oak, white oak, and the hickories, or in pure groves where it has colonized abandoned fields or open places in the forest.

Yield.—On south slopes and on the lower hills, where much of the merchantable timber has been removed for domestic use, there are from 500 to 1,500 feet B. M. of milling timber per acre. On north slopes and in the coves there is about 4,000 feet per acre. There is very little tan bark—perhaps 500 pounds of chestnut and hemlock per acre.

Demand.—One dollar per thousand feet is offered for ash, oak, and poplar on the stump.

Accessibility.—It is 12 miles from the mouth of the creek, by the wagon road, to Almond, the nearest railroad station.

Cutting.—Two small portable sawmills are at present in operation on the creek, one near its mouth and the other on the south prong. Their combined capacity is not more than 12,000 feet per day. Most of the timber has been cut below the forks of the creek.

Fire.—Standing timber has been much damaged by repeated ground fires, which have produced butt hollows, and by keeping the growth open have caused short and knotty boles. The south slopes and crests, and the lower hills are frequently burned.

Reproduction.—All the trees reproduce well by seed, especially the scarlet oak, chestnut, pines, and birch. The oaks and chestnut sprout freely on burned land.

Second growth.—Second growth is scant in the forests, on account of the frequent fires and browsing cattle. Where culling has been carried on in the hollows there are occasional thickets of red oak, birch, maple, and ash, and groves of young trees of black pine, birch, and maple in old pastures.

Undergrowth.—The forests are generally open below.

Rate of growth.—The hard woods make rapid accretion in the hollows, where they are not too crowded. The growth is much slower on south sides and on the lower hills. The black pine grows rapidly until about 40 years of age, when there is a decided decrease in its rate of accretion. It does not make a large tree.

A. DAMAGE BY FLOODS: RUINED PUBLIC ROAD, MITCHELL COUNTY, N. C.

B. DAMAGE BY FLOODS: DESTRUCTION OF AN APPALACHIAN MOUNTAIN VALLEY.

Water power.—There are two small water mills on the creek and there are sites for other mills requiring only a limited power.

Ownership.—The standing timber has been largely bought by various lumber companies, but the land is still owned by the residents. There are 43 families on the creek, which are about as many as it can support. The farms are small and poor and there is not much more land suitable for tillage.

Prices of land.—Agricultural lands on the alluvial valleys bring from $15 to $50 per acre, while that on hillsides bring only from $4 to $7 per acre. Forest land sells at $1 to $4 per acre.

TELLICO CREEK BASIN (MACON COUNTY, N. C.).

Area.—Total, 11 square miles; cleared, 1 square mile; wooded, 10 square miles; severely burned, none.

Surface.—Tellico Creek occupies a narrow valley 6 miles long, its headwaters lying on the steep upper slopes of Tellico Mountain. It flows into Little Tennessee River about 10 miles below Franklin. The upper part of the valley is steep and rough and there is almost no bottom land. The valley broadens out below; the hills are lower and not so steep and there are limited areas of alluvium.

Soil.—The soils, derived from mica-schists, quartz-schists, sandstones, and pyrophyllite, are generally deep, gray loams, for the most part even and fine-grained. Where the slopes are steep they wash badly on denudation.

Humus and litter.—The accumulated leaf mold is deep on north slopes and in the hollows, especially at a high elevation. On the lower hills and on south slopes, where the density is low and the forest has been badly burned, the ground in places is almost devoid of humus.

Agricultural value.—Nearly four-fifths of the land under cultivation is situated on slopes. Much of it has been in cultivation from fifty to one hundred years and many of the fields have been so badly worn as to be abandoned and have grown up in black pine. Some of these are now being recleared, the fertility of the soil having to some extent recuperated by this rotation. Corn, small grain, fruit, potatoes, and grass are grown. The land is not considered so productive as formerly, apples and grass especially not doing so well. Along the summits of the higher ridges there are occasional broad, rounded knobs, with deep, dark, fertile soil, upon which there is a natural stand of blue grass and other native grasses, which afford excellent pasturage during the summer and fall.

Timber trees.—On north slopes chestnut, white oak, red oak, hickory, some poplar, ash, and chestnut oak compose the economic forests. Chestnut and the oaks form three-fourths of the growth. On the hills and southern slopes scarlet

oak, white oak, chestnut, chestnut oak, and, below 3,500 feet, black pine are the common trees.

Yield.—The south slopes and hills will not cut more than 1,500 feet of merchantable timber to the acre; the north slopes and hollows from 3,000 to 4,000 feet, except at high elevations, where the growth is open and the trees are small and short-bodied.

Demand.—The best ash, oak, and poplar find ready sale at $1 per thousand feet on the stump.

Accessibility.—The mouth of the creek is 10 miles, by a rough wagon road, from Almond, a station on the Asheville and Murphy Branch of the Southern Railway. Tennessee River, into which Tellico Creek empties, can be driven.

Cutting.—There is at present one small portable sawmill in operation. Much of the best timber has been culled from the lower part of the creek, and nearly all of the merchantable timber has been removed from the low hills for domestic use, so that the forests now consist largely of young growth, seedlings, and stump shoots.

Fire.—The hill country and the south sides of the mountains have been badly burned, and in consequence the forests are thin, the growth short-bodied, and many of the trees defective.

Reproduction.—The important species seem to reproduce freely from seed wherever there are no fires and the light conditions are suitable. Chestnut, oak, sourwood, and hickory, and, to a less extent, the black pine sprout when the top is fire killed or cut.

Second growth.—In the culled woods of the hill country there are many saplings of scarlet oak, black pine, and sourwood. Grazing and fires, however, suppress most of the young growth of desirable species where the light conditions are suitable for germination and growth.

Undergrowth.—In many places there is considerable undergrowth of sourwood and huckleberries, which rapidly sprout when the old trees are killed by fire.

Rate of growth.—Fair accretion is made by most trees, except on the driest southern slopes, which are frequently burned.

Water power.—The stream is not large enough, being only 6 miles long, to furnish more than a small power.

Ownership.—Nearly all the land is owned by resident citizens. There are 22 families on the creek. Much of the timber has been bought by lumber companies.

Prices of land.—The best farming lands sell at $20 to $40 per acre; hillside farming land, at $4 to $10 per acre; woodland, at $1 to $4 per acre, according to the quality of the timber and its situation.

WHITE OAK CREEK BASIN (MACON COUNTY, N. C.).

Area.—Total, 15 square miles; cleared, 1 square mile; wooded, 14 square miles; severely burned, very little.

Surface.—The lower portion of the valley is narrow and rough, and the descent of the stream is very rapid. Above, there is a succession of benches, and the valley broadens out with a more gentle topography of low hills with rounded slopes.

Soil.—The soils for the most part are rather deep, gray loams, largely free from rocks and derived from metamorphosed sandstones. Where steep, they wash rapidly when cleared.

Humus and litter.—The south sides have little leaf mold on them. It is much deeper on the north slopes, especially in the hollows.

Agricultural value.—Corn and rye are the chief grains grown. Apples do well, and also grass and potatoes.

Timber trees.—Chestnut, scarlet oak, white oak, black oak, hemlock, and poplar form the greater part of the commercial forests. The hemlock and poplar and the best chestnut are in the hollows. Chestnut and scarlet oak form two-thirds of the forest on south slopes and at high elevations. Most of the timber its situated on Holloway and White Oak creeks above the flats.

Yield.—There are about 4,000 feet B. M. of milling timber per acre, except on the steep and rocky southern slopes, where there is less than half that amount.

Demand.—A considerable amount of timber has been cut below the flats and floated down the river. There is no sawmill on the creek, and very little timber has been cut above the flats.

Accessibility.—Roads can easily be made to the timber in any part of the basin, except in the lower part, where logs can be snaked directly into the creek. The creek can be driven during freshets.

Cutting.—Most of the merchantable poplar, ash, oak, and chestnut above 12 inches in diameter has been cut from below the flats.

Fire.—South slopes have been badly burned by repeated ground fires but the forests of the hollows and north slopes have suffered little, if at all.

Reproduction.—There is already a vigorous crop of young seedlings and stump sprouts on the lands which have been cut over, and it will do well unless destroyed by fire.

Second growth.—There is not much second growth in any of the denser forests, but in the wood lots attached to the farms there are many thickets of young trees.

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Undergrowth.—There is scant undergrowth, except occasional thickets of laurel on alluvial bottoms and on damp north slopes.

Rate of growth.—Accretion is good, except at high elevations and on the poor, dry soil of steep southern slopes.

Water power.—The water power is limited.

Ownership.—There are 21 families on the stream, living at or below the flats. There is considerable forest land suitable for agriculture on the upper part of the stream, which will be placed in cultivation as soon as the timber is cut and the land open to purchase.

Prices of land.—Farming land sells at $7 to $10 per acre; woodland, at $1 to $3 an acre.

CANEY FORK BASIN (JACKSON COUNTY, N. C.).

Area.—Total, 52 square miles; cleared, 4 square miles; wooded, 48 square miles; burned, 1 square mile.

Surface.—This area is extremely rough and rocky. The greater part of it is on the southern slope of the Balsam Mountains, and consists of a series of deep, parallel, north-south gorges alternating with steep and lofty ridges. There are only a few large tributaries, which enter the main river from the southeast. Those from the south head on Charlie Ridge and drain a very rough country. There is only a small amount of alluvial land and a small area of gentle slope.

Soil.—The soils are gray, loose loams, generally coarse grained, but in some places fine grained, derived from gneiss, schists, and metamorphosed sandstones; on very limited areas they are red and stiffer, derived from sandstones.

Agricultural value.—The soils are generally of good quality, and in many places produce fine grass and corn, but they are too steep to be economically cultivated and often wash badly. Some of the streams, such as Moses Creek, are well cleared, while others have only a few clearings.

Humus and litter.—Many of the south slopes have been very badly burned and the humus has been mostly destroyed. In nearly all of the hollows, however, it has been undisturbed.

Timber trees.—The forests are formed of characteristic Appalachian hard woods. Oak forms about 40 per cent; chestnut, about 35 per cent; maple, birch, ash, linn, buckeye, and yellow poplar in relative abundance about in the order named, form the larger part of the remainder. In some of the deep gorges there are large compact forests of hemlock, and there is some scattered spruce at high elevations on a few of the streams.

Yield.—The average yield is about 2,500 feet B. M. per acre.

Demand.—There is active demand for the best qualities of shipping lumber, and only the best qualities can be cut on account of the long haul to the railroad.

Cutting.—There are several small mills at present in operation, and it is reported that a railroad is to be built up the stream from some point on the Asheville and Murphy Branch of the Southern Railway and a large sawmill operated in connection with it. Some of the best timber has been cut out for several miles up the river and floated to the mills at Dillsboro. It was found, however, to be unprofitable and was abandoned.

Second growth.—There is no second growth of importance, except oak and chestnut sprouts in the farm woodland.

Undergrowth.—Both *Kalmia* and rhododendron form dense thickets in many places.

Rate of growth.—Accretion is good, except at high elevations.

Water power.—There is sufficient fall in the river to obtain considerable power at many places. Many small gristmills are at present using a part of this power.

Prices of land.—Farming land sells at $4 to $25 per acre; woodland, at $2 to $10.

BUCK CREEK BASIN (MACON COUNTY, N. C.).

Area.—Total, 11 square miles; cleared, 2 square miles; wooded, 9 square miles; severely burned, none.

Surface.—The topography of the Buck Creek basin is extremely broken. A few miles above its mouth the stream divides; the eastern fork heads under the steep slopes of Yellow Mountain, while the western heads under Hamburg Mountain. The hillsides are for the most part steep and rocky. The amount of alluvial bottom is limited to narrow tracts bordering the stream, and most of it is rocky.

Soil.—The soil is a gray, sandy loam, much of it coarse and rocky, derived in large part from the decay in situ of a coarse granite. Over a portion of the area it is derived from metamorphosed sandstones, and is deeper, finer grained, and more fertile. On account of the steep slopes, however, nearly all soils wash badly when denuded or cultivated, and are subject to drought, especially on the south slopes.

Humus and litter.—On the steep upper slopes, especially on the southern faces of Yellow and Hamburg mountains and their southern spurs, there is very little leaf mold, as the slopes are steep and have washed badly, and ground fires are frequent and severe. There is an excellent accumulation of humus, however, in the deep hollows opening to the north on the lower part of the stream.

Timber trees.—White oak, scarlet oak, chestnut, black oak, chestnut oak, hickory, yellow poplar, red oak, birch, linn, and ash, in relative abundance about in the order named, form the greater part of the forest. The scarlet oak, white oak, chestnut, and chestnut oak form the dominant growth on the steep southern slopes. The trees are small in size and the forest contains little merchantable timber beyond the fuel and tan bark. Yellow poplar, birch, linn, hemlock, and ash are confined to the cool north slopes and hollows.

Yield.—The average stand per acre is 2,000 to 3,000 feet B. M. of merchantable timber, except on the steepest and most stony southern slopes, where in many places it is less than 500 feet. In addition to the mill timber there are about 14 cords of small wood and about 1 cord of oak and hemlock tan bark per acre

Demand.—There is at present no demand for timber

Accessibility.—The mouth of the stream is 35 miles from Dillsboro, the nearest railway station, by way of a rough road. Cullasagee River, into which Buck Creek flows, is large enough to float logs, and some timber has been cut, especially on the lower part of the creek, and floated down the river.

Cutting.—There is no mill at present on the creek, though a small one was operated for a short time. Much of the best timber, however, has been culled for domestic use.

Fire.—Nearly all of the south slopes have been badly burned, and much of the mature timber has defective butts. A great part of the young growth has been reduced to stool shoots, there being often half a dozen sprouts from the same stump, the result of repeated fires.

Reproduction.—Nearly all of the broad-leaved species, when small, sprout freely from the stump when cut or fire killed. This is especially true of the scarlet oak, chestnut, and white oak. Where protected from fire, and suitable light conditions prevail, there are abundant seedlings of nearly all the species, especially of the oaks, birches, and chestnut.

Second growth.—Second-growth timber is scant. A large part, especially in the thin woods on the southern slopes, consists of stool shoots. In the hollows, where poplar, oak, and ash have been culled, there are often thickets of oak, yellow poplar, chestnut, and ash which have grown since light was admitted by culling. A portion of the woodland is closely pastured and the growth of broad-leaved species is much retarded thereby.

Undergrowth.—Shrubby undergrowth is scant, but there are occasional thickets of *Kalmia* and bush honeysuckle.

Rate of growth.—Accretion is slow in the forests at the head of the stream, and the trees there attain only a small size. On the lower slopes

however, especially near the mouth of the stream, the rate of growth is much more rapid.

Water power.—The stream is too small to yield any large amount of power, but there are many falls and available sites for dams and buildings which could be utilized by small plants.

Ownership.—There are 5 families on the right-hand fork of the stream and about 35 on the left-hand fork and on the main stream. These own the greater part of the land.

Prices of land.—Farming land sells at $4 to $12 per acre; woodland, at $1 to $3 per acre.

WAYAH CREEK BASIN (MACON COUNTY, N. C.).

Area.—Total, 13 square miles; cleared, 1 square mile; wooded, 12 square miles; severely burned, none.

Surface.—The greater portion of the watershed of the creek is much broken, it being a deep, narrow valley, about 8 miles long, surrounded, except at its mouth, by high ridges with steep slopes. There are some limited alluvial bottoms on the lower 3 miles of the basin and beyond these bottoms, on either side, some low hills with gentle slopes.

Soil.—The soil, except of the alluvial bottoms, is a gray loam, often sandy and for the most part very rocky, derived from metamorphosed sandstone. The alluvial lands have a fine-grained, loamy soil, largely mixed with organic matter.

Humus and litter.—There is very little humus on any of the south slopes. On the north slopes, however, and in the deep hollows it is often abundant.

Agricultural value.—The soils are poor, difficult to cultivate, and wash badly, except on the limited alluviums of the lower 3 miles. Much of the soil is badly worn. Some fields have been in cultivation continuously for more than fifty years.

Timber trees.—Chestnut, white oak, scarlet oak, black oak, poplar, birch, and ash, in relative abundance about in the order named, constitute the greater part of the forest. Chestnut, white oak, and scarlet oak form about 80 per cent of the entire growth, and chestnut alone, nearly 40 per cent. On dry south slopes chestnut, white oak, scarlet oak, black oak, and hickory are most abundant and form nearly the entire growth, while on north slopes and in the hollows chestnut, white oak, hickory, poplar, birch, ash, and linn, with occasional hemlock, form the greater part of the growth. A large part of the forest is composed of vigorous young trees from 60 to 100 years old in nearly even age stand, which sprang up on an old fire scald. Many of these trees are evidently stool shoots. This is especially true of the chestnuts and scarlet oaks. The stand is very dense and the trees are clear stemmed and straight.

valley being narrow and the slopes steep. The lower part opens out into low, rounded hills, with many small alluvial bottoms between them.

Soils.—In the mountains and in the upper part of the basin the soils are gray and sandy, and often very rocky. The red lands in the lower portion of the valley are more productive and durable. The bottoms are generally fertile, and are loamy or silty.

Humus and litter.—In the mountains the leaf mold is good, except on steep south slopes or poor dry soils. It is generally scant in the woods on the red hills.

Agricultural value.—The gray, sandy, upland soils are not fertile, though they produce fair crops of corn for a few years after they have been cleared. The stiff, red lands are more productive.

Timber trees.—Chestnut and the oaks form two-thirds of the growth. Associated with these are hickory, maple, ash, linn, and poplar, with some hemlock and yellow pine.

Yield.—The forest will cut about 3,000 feet B. M. per acre.

Accessibility.—There is a fair wagon road from Whittier, on the Southern Railway, up the valley.

Cutting.—Much of the best timber has been culled, but at the head of the stream there is yet a considerable area of uncut forest.

Second growth.—The second growth is confined to the lower part of the valley, and consists of oak, chestnut, and hickory.

Undergrowth.—There are many laurel thickets in the mountains at the head of the valley. The woods of the lower part are generally open.

Reproduction.—All of the species reproduce well, and clumps of young trees are frequent.

Rate of growth.—Accretion in the moist hollows at a low elevation is good. It is much slower at higher elevations and on the dry soils of the lower part of the basin.

Water power.—Several small water mills are in operation, but they do not utilize much power. There are many available sites for small mills, but only a limited power could be developed because of the small size of the stream.

Ownership.—All of the basin, except the lower and the extreme eastern part, is owned by the Eastern band of Cherokee Indians. These parts are divided among small landholders.

Occupancy.—Nearly 50 families live on the stream.

Prices of land.—Farming land sells at $6 to $50 per acre; woodland, at $2 to $8 per acre.

OCONALUFTY RIVER BASIN ABOVE FORKS (SWAIN COUNTY, N. C.).

Boundaries.—The divides, including the entire drainage basin above the forks of the river.

Area.—Total, 140 square miles; cleared, 5 square miles; wooded, 135 square miles; severely burned, 3 square miles.

Surface.—The area is very rough and rugged. The valleys are narrow, and, except on Mingus Mill Creek, there are almost no alluvial bottom lands. The divides between the different tributaries of the river are high, with steep slopes, which begin at the very banks of the streams. There are extensive areas strewn with great fragments of rock, and cliffs and precipitous banks are frequent.

Soils.—Loams and sandy loams are the common soils on the slopes and in the narrow bottoms. Where not too coarse and gravelly they produce well until the organic matter is exhausted.

Humus and litter.—There is a deep accumulation of leaf mold in the deep hollows at the heads of the streams where there has been no fire, but on all the drier land, especially that at a low elevation and on south slopes, it is deficient.

Agricultural value.—Corn is the staple crop; though some oats and a small amount of wheat are grown on some of the sandy alluvia, the soils are too light to render grain a profitable crop or farming a very profitable business. Apples and peaches do well in certain places.

Timber trees.—Mixed hard woods, with hemlock, and, near the heads of the streams, spruce, compose the forest. About 70 per cent of the stand is oak and chestnut.

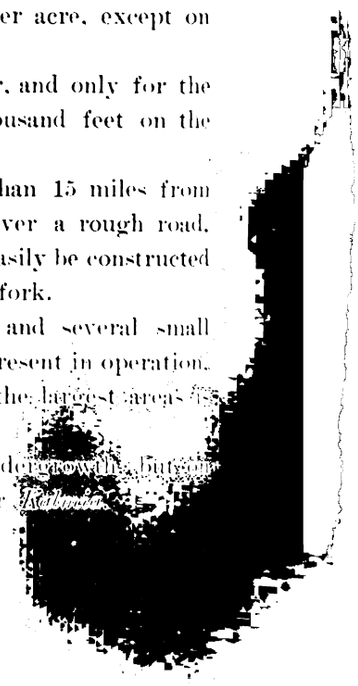
Yield.—The forest will cut more than 3,000 feet B. M. per acre, except on the dry slopes in the lower part of the valley.

Demand.—There is no demand except for shipping lumber, and only for the best grades of that, which command about 50 cents per thousand feet on the stump.

Accessibility.—The nearest point in the basin is more than 15 miles from the Asheville and Murphy Branch of the Southern Railway, over a rough road, which, however, could cheaply be improved. A railroad could easily be constructed up the river to the forks and several miles beyond up either fork.

Cutting.—Some cutting has been done on Raven Fork, and several small areas on the left fork have been culled. Only one mill is at present in operation, but it is stated that a company which has purchased one of the largest areas is to construct a railroad.

Undergrowth.—A great part of the area is destitute of undergrowth, but on many of the colder slopes there are dense thickets of laurel or rhododendron.



Reproduction.—Groups of young trees are frequent over nearly all the area that has been burned, appearing in open places where old trees have been killed or wherever the light conditions are suitable. These groups consist chiefly of oak, chestnut, and maple, though other hard woods are not uncommon. There are many clumps of young trees beneath the shade of the spruce which would grow rapidly if the cover were removed. The large areas of open forest, where there is no young growth, would readily restock naturally if afforded protection. This condition chiefly prevails on the lands of the Cherokee Indians.

Rate of growth.—At lower elevations the growth is rapid, but it decreases toward the summits of the high mountains.

Water power.—The streams are all rapid and there are many sites for dams, but the volume of water is not large enough in any stream to yield a large power.

Ownership.—The largest areas of forest land are the 20,000 acres in the reservation of the Cherokee Indians; the Howell tract of 10,000 acres; and the Whittier tract, about 7,000 acres of which are on this stream.

Occupancy.—There are only about 70 families on this portion of the river, and most of these are in the Indian settlement on Raven Fork.

Prices of land.—Farming land sells at $5 to $25 per acre; woodland, at $2 to $5 per acre.

OCONALUFTY RIVER BASIN BELOW FORKS (SWAIN COUNTY, N. C.).

Boundaries.—This area embraces all of the drainage basin below the forks of the river, except the valley of Soco Creek.

Area.—Total, 29 square miles; cleared, 9 square miles; wooded, 20 square miles.

Surface.—Narrow alluvial bottoms, or in a few places fairly large ones of 50 or more acres, border a great part of the river. Beyond these lie a narrow belt of hills with many gentle slopes, from which rise steep and rough mountains.

Soils.—The soils of the mountains and hills in the upper part of the area are sandy, being derived from sandstones and quartzite. On the hills in the lower part of the basin red clays and red loams, derived from schists and fine-grained sandstones, prevail. The alluvials are sandy and often coarse grained.

Humus and litter.—In most places leaf mold is scant, as the prevailing aspect is southerly, but on fertile slopes and in the deep hollows it has accumulated to a greater depth.

Agricultural value.—The sandy alluvials and the red soils are fairly productive, yielding corn, small grain, clover, and pease, but will not long remain set in grass. The gray, sandy soils do not wear well and soon become thin. There are a few silty alluvia of fine producing capacity.

Timber trees.—The oaks, yellow and black pines, chestnut and hickory, in relative abundance about in the order named, form the greater portion of the forests, except in the hollows, where typical Appalachian hard woods prevail.

Yield.—Average, 1,700 feet B. M. per acre.

Demand.—While there is no local demand, the nearness to the railroad renders most of the best timber merchantable.

Accessibility.—The center of the valley is about 7 miles from the Southern Railway, by means of a fair wagon road, which could easily be improved.

Cutting.—No mills are in operation at present, but much of the best timber has been cut and shipped.

Second growth.—Scarlet, white, and black oaks, shortleaf and black pines, and hickory form most of the second growth, which is abundant only in the vicinity of the larger and older settlements.

Undergrowth.—With the exception of groups of young trees and occasional clumps of *Kalmia* or other shrubs, undergrowth is scant.

Reproduction.—Groves of young trees are frequent in culled woods, showing that the forests will readily regenerate.

Rate of growth.—On account of the prevailing thin, dry soil, accretion is rather slow.

Water power.—There are numerous sites for small dams. The run-off is rapid, and short periods of very high water are frequent, following heavy rainfall in the mountains.

Ownership.—The Eastern band of the Cherokee Indians owns a large portion of the mountain land. The rest of the land is divided into numerous small holdings.

Occupancy.—There are about 80 families living on this part of the river.

Prices of land.—Farming land sells at $6 to $30 per acre; woodland, at $1 to $5 per acre.

TWENTYMILE CREEK BASIN (SWAIN COUNTY, N. C.).

Area.—Total, 24 square miles; cleared, 0.5 square mile; wooded, 22.5 square miles; severely burned, 1 square mile.

Surface.—The entire basin is broken into steep hills or rugged mountains, with some very small bottoms about the middle of the basin

Soils.—The soils are generally sandy and rather coarse grained, but they seem to be well suited to forest growth.

Humus and litter.—In the deep hollows and on north slopes there is an accumulation of leaf mold. In some places it is very deep. On the [illegible] hills near the mouth of the stream and on many of the dry southern slopes, especially such as have been burned, it is often very scant.

Agricultural value.—The soils are not productive, though when first cleared they produce good crops of corn and grass. They are too steep, however, and too sandy to work well agriculturally.

Timber trees.—The basin is generally lightly timbered, though in the coves and on the north slopes at the upper part of the basin there are some small areas of very heavy timber. Oak, chestnut, and hickory form the greater part of the growth on the slopes; while with these are associated birch and maple, with some ash, linn, and hemlock in the hollows and in other cool moist situations. There is some yellow pine, but its commercial importance is slight.

Yield.—The yield is not more than 2,000 feet B. M. per acre.

Demand.—There is at present no demand, as the distance from the nearest railroad station makes remunerative sawing impossible.

Accessibility.—The mouth of the stream is 20 miles distant, both from Maryville, Tenn., and Bushnell, N. C. There is a rough road for 4 miles up the stream, which could easily be improved.

Cutting.—There are no mills at present in operation. Some of the best timber has been cut and floated down the Tennessee River to Chattanooga. As the river between the mouth of this stream and Chilhowee, Tenn., is extremely rough, where it breaks through the Smoky Mountains, many logs are badly split in going through, and there is often a great loss of stranded logs below Chilhowee.

Second growth.—There is no second growth of importance.

Undergrowth.—There is considerable undergrowth on some slopes, especially where there have been ancient fires, and many shoots have sprung up from the stools of young fire-killed trees. In places are *Kalmia* thickets, but there are not enough of these, nor are they dense enough to present any serious impediment to logging, except at the head of the stream in a few of the deep coves.

Reproduction.—Groves of young trees, some apparently seedlings and others evidently stool sprouts, are frequent in woods that have been burned.

Rate of growth.—Accretion is fair, except on the thin, dry soil of south slopes. In the cool, moist hollows it is good.

Water power.—There are numerous sites for dams. In some places they could easily be built from 20 to 40 feet in height, where there are steep slopes on either side of the creek. Good building sites, however, are few. The amount of power that could be secured would in any event not be very large.

Occupancy.—There is only one family at present living on the stream.

Prices of land.—Lands are held at about $2.50 per acre. It has been reported that valuable mineral deposits have been found on the stream.

EAGLE CREEK BASIN (SWAIN COUNTY, N. C.).

Area.—Total, 94 square miles; cleared, 60 acres; wooded, 34 square miles; severely burned, 2 square miles.

Surface.—The surface is very rough, especially at and near the mouth of the creek where the basin is constricted by steep and rugged cliffs, and at the upper part where the mountains are steep and rocky. In the middle part of the basin, where the creek forks, there are some gentle slopes which lie well for cultivation.

Soils.—The soils are largely derived from slates and quartzite; in some places they are sandy, but are generally very good for forest growth.

Humus and litter.—The prevailing forest floor is a deep leaf mold. It is often absent or scant on south slopes or where fires are prevalent.

Agricultural value.—Considering the general steepness, the land will probably yield good crops of corn, grass, apples, potatoes, and other produce. Much of the land in the coves seems to be fertile.

Timber trees.—Oak and chestnut are the predominant trees throughout the basin. On the lower part white pine and hickory are associated with them. On the upper part, especially in the deep hollows which indent the slopes of the Smoky Mountains and the great ridges which spring from it, poplar, ash, hemlock, birch, maple, and buckeye are associated with the oaks and chestnut.

Yield.—Three thousand to four thousand feet B. M. per acre is the yield on the best land on the upper part of the creek. The land of the lower part is less heavily timbered.

Demand.—There is at present no demand for lumber, as the distance from transportation facilities and the absence of roads prevent shipment.

Accessibility.—There is no road on the creek, only bridle paths leading to the farms. A very rough road up Tennessee River leads from the mouth of the creek to Bushnell, the nearest station on the Southern Railway.

Second growth.—Second growth is scant, except in a few places where there have been fires.

Reproduction.—Reproduction is generally good, and there is in many places a heavy growth of saplings beneath the old trees.

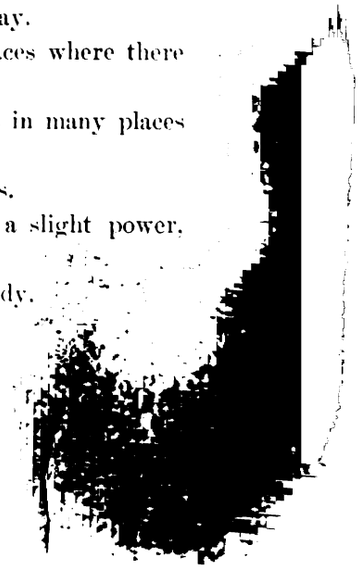
Rate of growth.—Accretion is good, especially in the hollows.

Water power.—The stream is too small to yield more than a slight power, although it has a great fall.

Ownership.—The greater part of the basin is held in one body.

Occupancy.—There are only 2 families living on the stream.

Prices of land.—Land is said to be held at $2.50 per acre.



HAZEL CREEK BASIN (SWAIN COUNTY, N. C.).

Area.—Total, 52 square miles; cleared, 3 square miles; wooded 49 square miles; severely burned, 3 square miles.

Surface.—The basin lies between two of the southern spurs of the Smoky Mountains. For several miles above its mouth the stream flows through a gorge. Nearer its head it forks several times and the basin broadens, but the mountain slopes, which rise from the brink of the stream, are with few exceptions steep and rough.

Soils.—Slates, sandstone, and quartzite form the country rock and yield loose or sandy-loam soils, often coarse grained and rocky, shallow, except at the heads of the hollows, and only moderately fertile. There are no alluvial lands.

Humus and litter.—In the lower part of the basin, and where the woodland is closely pastured and frequently burned, and on many south slopes above, leaf mold is scant. In the deep hollows and on north slopes in the upper part of the valley the soil is protected by a deep accumulation of humus.

Agricultural value.—The soils are too sandy and the slopes are generally too steep and rocky to be extensively used agriculturally, though there are a few areas which are suitable for permanent farms. The common crops of the region do well where the soil is fertile.

Timber trees.—Below the forks of the creek oaks, chestnut, and hickory, in relative abundance in the order named, compose the forest. Above the forks chestnut and oaks are associated with birch, maple, hemlock, and linn. There is some spruce at high elevations.

Yield.—The yield is more than 3,000 feet B. M. per acre, except on the lower part of the stream.

Demand.—On account of the distance to the nearest railroad point only the choicest trees are cut, and sell at 50 cents to $2 per thousand feet on the stump.

Accessibility.—There is no good road down the lower part of the valley. The main road turns across the southern end of Forneys Ridge to Bushnell, on Little Tennessee River, 8 miles above the mouth of the creek; this is the nearest station on the Asheville and Murphy Branch of the Southern Railway. Rough roads extend up both branches of the stream nearly to its head.

Cutting.—One small mill is in operation, cutting oak, yellow poplar, and ash. Some cutting has been done to within 5 miles of the head of the stream.

Second growth.—Oak, hickory, maple, and chestnut form the second growth, which is scant.

Undergrowth.—Thickets of laurel, rhododendron, and other shrubs often occur at high elevations.

corn, and apples are the chief crops. Small grain, except rye, does not do well. Grass is successfully raised, but it sometimes dries out on thin, porous soils.

Timber trees.—Scarlet oak, white oak, chestnut oak, chestnut, hemlock, red oak, and birch, with occasional poplar, ash, linn, hickory, and maple, in relative abundance about in the order named, constitute the dominant element of the commercial forest. The first four species form three-fourths of the growth of the upland forests. The hemlock is found in nearly pure groves along the colder valleys of the watershed. The red oak, birch, poplar, ash, and linn occur chiefly in the deep hollows with moist, fertile soil.

Yield.—The average yield of the hard woods will be less than 2,000 feet B. M. per acre and perhaps 15 cords of small wood in addition. The hemlock forests in the upper part of the basin will cut from 10,000 to 15,000 feet B. M. per acre and yield about 12 cords of tan bark. There is also considerable oak tan bark.

Demand.—At present there is no demand for any kind of shipping timber.

Accessibility.—The valley is 25 miles from the nearest railroad station on the Southern Railway. The wagon roads are in poor condition and badly graded. Except in the lower part, the creek is not large enough to splash, and there only in times of very high water.

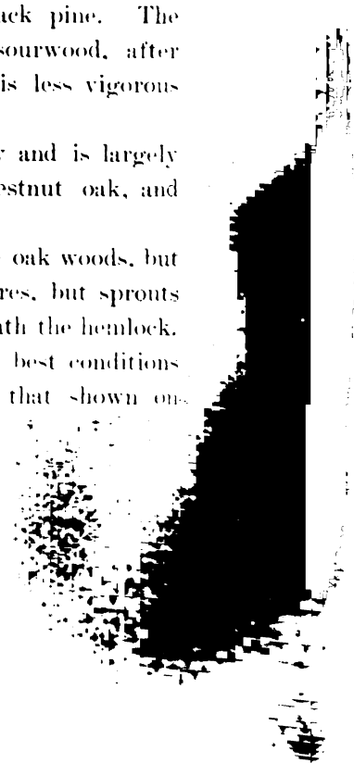
Cutting.—There are no mills at present in operation and very little cutting is being done on the creek.

Fire.—The greater part of the forest has been severely injured by repeated ground fires, which have destroyed the humus, and greatly reduced the forest cover by repeatedly suppressing the young growth and so increasing the dryness of an already poor and shallow soil. In spite of the destruction of the mold, many of the species reproduce abundantly by seed, especially the scarlet oak, chestnut, white oak, and sourwood, and where it occurs, the black pine. The reproduction from stools of young-growth oak, chestnut and sourwood, after being top killed by fires, is free and vigorous; that of the pine is less vigorous and is confined to small trees.

Second growth.—The second growth in most places is scanty and is largely formed of stool shoots of scarlet oak, white oak, chestnut, chestnut oak, and sourwood, and seedling black pine.

Undergrowth.—*Kalmia* forms most of the undergrowth in the oak woods, but in most places there is very little of it. It is often killed by fires, but sprouts vigorously from the old stools. There are thickets of laurel beneath the hemlock.

Rate of growth.—Trees grow slowly and only under the very best conditions attain a large size. The rate of accretion is about the same as that shown on Norton Creek, in Jackson County, N. C.



Water power.—There are many small falls on the stream which would furnish power to small manufacturing plants.

Prices of land.—Farming land sells at $4 to $15 per acre; woodland, at $1 to $4 per acre. The greater part of the land suitable for agriculture is at present in cultivation.

TENNESSEE RIVER BETWEEN BUSHNELL AND THE STATE LINE (SWAIN AND GRAHAM COUNTIES, N. C.).

Boundaries.—This area embraces the north and south slopes, which drain directly into Tennessee River through small streams which have not been described.

Area.—Total, 49 square miles; cleared, 5 square miles; wooded, 39 square miles; burned, 5 square miles.

Surface.—The river flows through a gorge for 20 miles below Bushnell. The hills rise with steep, rocky, and often precipitous slopes from the very banks of the river, leaving on either side scarcely room for the construction of a narrow wagon road. In a few places only are there scant alluvial bottoms. For 6 miles below Rocky Point the river breaks through the Smoky Mountains. This part of its course is so rough and the cliffs on either side are so steep that there is no room for a wagon road.

Soils.—The soils are very thin and sandy, especially on the north side of the river. At the heads of some of the smaller streams are rounded hills, less steep and with deeper soils, but the country is entirely too rough for profitable farming, although there are more than 20 families living along the river.

Humus and litter.—On the north side of the Yellow Creek Mountains an excellent forest condition prevails, with deep humus and undisturbed litter. The south slopes on the opposite side of the river have been frequently burned, and leaf mold is scant.

Agricultural value.—On account of their steepness, sandiness, and rockiness the soils have a very slight value. Corn is the staple and almost the only crop.

Timber trees.—On the north side of the river oak, chestnut, and hickory, with yellow pines, are the characteristic trees. On the south side typical Appalachian hard woods prevail; oak, chestnut, birch, maple, and occasionally linn and ash, associated in many places with hemlock.

Yield.—The yield will not be more than 1,500 feet B. M. per acre.

Demand.—There is no local demand. Most of the best timber and the tan bark has already been cut from that portion of this area which is near enough to Bushnell to be profitably lumbered.

Cutting.—No mills are in operation at present, but much of the best timber and a great part of the accessible tan bark has been cut.

Second growth.—Second growth is scant, and largely consists of chestnut, oak, and hickory sprouts with yellow-pine seedlings.

Undergrowth.—South slopes are sometimes brushy with *Kalmia* and young tree growth, which has followed fires; north slopes with laurel.

Reproduction.—Trees reproduce freely on moist north slopes; poorly on dry south ones.

Rate of growth.—Accretion is good.

Water power.—There is ample fall in the stream and there are several sites for dams and small buildings. No power is at present being utilized.

Ownership.—Much of the land is in small holdings. Several of the large tracts, which lie on the larger of the tributary streams, extend to the river.

Prices of land.—Timber land sells at $1 to $5 per acre.

TUCKASEGEE RIVER (SOUTH SIDE) BETWEEN WEBSTER AND BUSHNELL (JACKSON AND SWAIN COUNTIES, N. C.).

Boundaries.—This area includes the north slope of the Cowee and Alarka mountains from the Savannah Creek watershed to the confluence of Tuckasegee and Tennessee rivers. It is drained by several small streams, the most important of which are Barker, Connelly, and Kirkland creeks.

Area.—Total, 65 square miles; cleared, 11 square miles; wooded, 54 square miles.

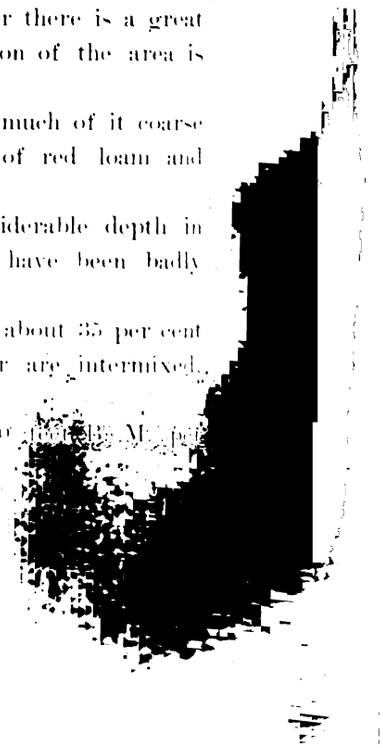
Surface.—The area is divided into a series of deep hollows which indent the northern face of the Cowee and the Alarka mountains and drain through many small streams northward into Tuckasegee River. Near the river there is a great deal of rolling land and some low hills. The southern portion of the area is very rough.

Soil.—The soil is a gray, sandy loam, derived from gneiss, much of it coarse grained and rocky. Near the river there are limited areas of red loam and stiff loam soils deep and smooth.

Humus and litter.—Leaf mold has accumulated to a considerable depth in nearly all of the hollows, but many of the mountain slopes have been badly burned and the ground cover destroyed.

Timber trees.—Oaks form about 45 per cent and chestnut about 35 per cent of the forest. In the hollows maple, birch, ash, and poplar are intermixed, and near the river there is some hickory and yellow pine.

Yield.—The stand of merchantable timber is about 3,000 [illegible] M. per acre, largely oak.



Demand.—There is an active demand for good grades of nearly all kinds of timber. The best grades of oak and other hard woods bring from $2 to $4 per thousand feet on the stump.

Accessibility.—The Asheville and Murphy Branch of the Southern Railway, following the river, skirts the entire northern border of the area. Nearly every stream has a wagon road built up it.

Cutting.—There are several small sawmills at present cutting in this area. Mills have been cutting here continually for the past ten years, and nearly all the best timber has been removed. There is a locust-pin mill at Dillsboro, which has nearly exhausted the supply of locust. Tanneries at Waynesville and Andrews have secured much of their bark from this area, and another tannery is in course of erection at Sylva.

Reproduction.—There are many thickets of young trees in the culled woodland, and, with adequate protection, excellent results in reproducing can be secured.

Second growth.—Second growth is scant, except in the older settled regions in the farm woodland, where most of it is oak and chestnut stool shoots.

Undergrowth.—There are a few laurel thickets, but the undergrowth is generally not dense enough to be a serious impediment to either reproduction or logging.

Rate of growth.—Accretion is generally good.

Water power.—The small streams yield very little power, though there are gristmills on nearly all of them. There are two mill sites at Dillsboro, on the Tuckasegee, each capable of yielding 100 or more horsepower, while below there are several other sites where dams 8 to 12 feet high can be erected.

Ownership.—The greater portion of the forest is held in small tracts by residents. The Eastern band of the Cherokee Indians hold several thousand acres in the Alarka Mountains.

Occupancy.—The hills along the river are thickly settled and the valleys of nearly all the small streams are well cleared.

Prices of land.—Farming land sells at $6 to $100 per acre; woodland, at $1 to $10 per acre.

DEEP CREEK BASIN (SWAIN COUNTY, N. C.).

Area.—Total, 48 square miles; cleared, 6 square miles; wooded, 42 square miles.

Surface.—The basin lies between two spurs of the Smoky Mountains. Its upper portion is rough and mountainous. The mountain slopes are steep and rise abruptly, often precipitously, from the banks of the streams. The lower portion of the valley broadens out into low, rounded hills.

PANTHER CREEK BASIN (GRAHAM COUNTY, N. C.).

Area.—Total, 23 square miles; cleared, 1.50 square miles; wooded, 21.50 square miles.

Surface.—Moderately mountainous. Some of the narrow bottoms and lower slopes are arable.

Soil.—Fertile.

Humus and litter.—Light. Repeated fires have reduced them.

Agricultural value.—Slight, except along the narrow bottoms, where corn and grass do well.

Timber trees.—The principal timber trees are the oaks, hickory, chestnut, cucumber, and buckeye.

Yield.—Log timber, 27,520 M feet B. M.; small wood, 247,680 cords.

Demand.—One dollar per thousand feet on the stump is paid for "export timber."

Accessibility.—The remotest part of this tract is within 12 miles of the railroad at Bushnell.

Cutting.—Poplar, ash, walnut, and cherry have been culled from the lower portion of the valley and from the lower coves.

Fire.—Ground fires have been very frequent.

Reproduction.—Free, except along the crests of ridges. The new stock is of the same species as the old.

Second growth.—Deficient, owing to the prevalence of fires during many years past. The best stand of saplings is on wood lots where protected from fire.

Undergrowth.—Reduced by fire and grazing.

Rate of growth.—Moderate.

Water power.—The stream is small, except in its lower course.

Prices of land.—The best land could be bought for about $5 per acre.

STEKOAH CREEK DISTRICT (GRAHAM COUNTY, N. C.).

Boundaries.—The divides, including the whole drainage basin of this stream and Sawyer Creek.

Area.—Total, 20.50 square miles; cleared, 2.80 square miles; wooded, 17.70 square miles.

Surface.—Moderately mountainous ridges, with narrow creek bottoms.

Soil.—The bottoms are fertile; the ridges have light soil and become very dry at times.

Humus and litter.—Usually scant because of much burning.

Agricultural value.—Only the bottoms and coves are worth cultivating.

Timber trees.—Same as on Panther Creek, except perhaps a larger proportion of hemlock and poplar.

Yield.—Log timber, 22,656 M feet B. M.; small wood, 169,920 cords.

Demand.—Hard woods and hemlock are not saleable at present. Other species bring from $1 to $2 per thousand feet on the stump.

Accessibility.—The principal coves are about 8 miles from Little Tennessee River, or 14 miles from Bushnell, over a rough wagon road.

Cutting.—Beside the land cleared, much timber has been cut, both for market and for local use.

Fire.—Light surface fires have been frequent.

Reproduction.—Seedlings start freely, but are usually killed by fire.

Second growth.—The customary fires have prevented the growth of saplings.

Undergrowth.—Reduced by fire and grazing.

Rate of growth.—Moderate.

Water power.—Small powers are abundant.

Ownership.—Most of the land is held by residents.

Prices of land.—The best farms could be bought for $10 per acre. The woodland on the ridges would go for much less, probably $1 per acre.

LITTLE AND BIG SNOWBIRD CREEK BASINS (GRAHAM COUNTY, N. C.).

Area.—Total, 30 square miles; cleared, 1.17 square miles; wooded, 28.83 square miles.

Surface.—Steep mountain slopes, with narrow stream bottoms.

Soil.—Variable. Most of the bottoms and the cove land is dark and fertile loam. The soil on the ridges is lighter, yet very productive on north slopes.

Humus and litter.—Abundant on north and light on south slopes.

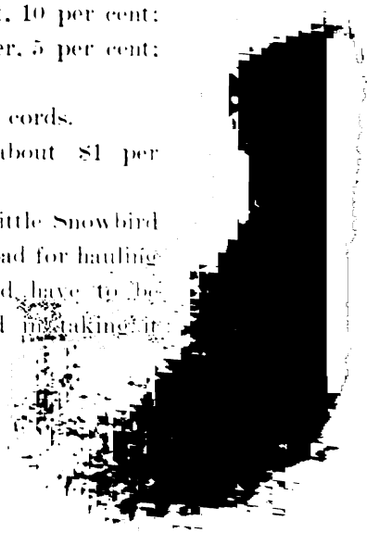
Agricultural value.—Slight. Very little arable land and what there is, is much interrupted.

Timber trees.—Oaks, 50 per cent; hickory, 10 per cent; chestnut, 10 per cent; hemlock, 8 per cent; birch, 5 per cent; maple, 5 per cent; cucumber, 5 per cent; buckeye, 5 per cent; ash, 1 per cent.

Yield.—Log timber, 72,000 M feet B. M.; small wood, 270,000 cords.

Demand.—The price of stumpage for the best timber is about $1 per thousand feet. Bark brings $5 to $7 per cord at the railroad.

Accessibility.—A wagon road has been built from the head of Little Snowbird Creek to Marble. The lower portion of the stream has no suitable road for hauling lumber. The timber from this portion, to reach Andrews, would have to be taken over a high mountain. Much less upgrade would be found in taking it to Nantahala.



Cutting.—A mill is operating on the upper portion of Little Snowbird Creek, while from the lower portion the floatable logs (poplar, ash, etc.) were cut some ten years ago and driven down Cheoah River.

Fire.—The southward slopes have been much burned. Humus has been consumed and seedlings killed. The northern slopes have escaped frequent fires.

Reproduction.—Except for fire and cutting reproduction would be free. Persimmon and sumac form the most abundant new growth on old clearings.

Second growth.—There are many saplings 8 to 10 inches in diameter, but most of those that have started later have been subdued by fire.

Undergrowth.—Reduced by fire and grazing, except the laurel patches along streams and north slopes.

Rate of growth.—Medium.

Water power.—Abundant.

Prices of land.—From $1 to $5 per acre.

WEST BUFFALO CREEK BASIN (GRAHAM COUNTY, N. C.).

Area.—Total, 18 square miles; cleared, 0.66 square mile; wooded, 17.34 square miles.

Surface.—Rough and steep about the head of the stream, but moderately mountainous elsewhere, with narrow, interrupted stream bottoms.

Soil.—Rather light.

Humus and litter.—Abundant only on the northern slopes; light elsewhere.

Agricultural value.—Only about 500 acres are worth cultivating.

Timber trees.—Chestnut oak, 15 per cent; white oak, 10 per cent; black oak, 10 per cent; chestnut, 20 per cent; hickory, 10 per cent; poplar, 5 per cent; hemlock, 10 per cent; cucumber, 5 per cent; gum, 15 per cent.

Yield.—Log timber, 46,080 M feet B. M.; small wood, 207,360 cords.

Demand.—The best prices for log timber are $4 per thousand feet on the stump. Hemlock is considered worthless, and the price of oak is nominal.

Accessibility.—A wagon road leads from Nantahala to within 6 miles of the head of the stream.

Cutting.—Two mills are now operating—one on Little Buffalo Creek and one well toward the head of the main stream. The sawed lumber is being hauled to Nantahala.

Fire.—The southern slopes are usually burned over every year.

Reproduction.—Seedlings appear, but are soon killed by fire.

Second growth.—Saplings are fairly abundant on northward slopes, but on south exposures the supply is deficient.

Undergrowth.—Scant on south and dense on north slopes.

Rate of growth.—Rapid.

Water power.—Abundant.

Prices of land.—From $1 to $10 per acre.

SANTEETLA CREEK DISTRICT (GRAHAM COUNTY, N. C.).

Boundaries.—The divides comprising the entire drainage basin of this creek above the mouth of Little Santeetla Creek.

Area.—Total, 20 square miles; cleared, 0.84 square mile; wooded, 19.16 square miles.

Surface.—Very steep and rocky mountain sides, with narrow bottoms, frequently stony along the stream.

Soil.—Light loam, sometimes gravelly.

Humus and litter.—Light, especially on southern slopes.

Agricultural value.—Very slight.

Timber trees.—Same as in West Buffalo Creek basin.

Yield.—Log timber, 256,000 M feet B. M.; small wood, 192,000 cords.

Demand.—Timber has no stumpage value because access is too difficult.

Accessibility.—Difficult; the wagon road is rough and steep, and the stream is not drivable with profit.

Cutting.—From six to ten years ago the log timber nearest the stream was cut by the Beldings as far as the mouth of Indian Creek, but great difficulty was found in taking out the logs.

Fire.—Fires are common whenever it is dry enough for them. The undergrowth and pasturage are much reduced by fire.

Reproduction.—Seedlings start abundantly, but fires and browsing subdue them. On the south slopes very few survive.

Second growth.—Many saplings south of the stream, but north of it very few.

Undergrowth.—Scant, especially on the south slopes. Along the streams there is much laurel, especially in the north coves.

Rate of growth.—Medium, except on the ridges, where it is slow.

Water power.—Abundant water, but the stream is subject to sudden rises, and the fall is rapid.

Prices of land.—From 50 cents to $3 per acre.

LITTLE SANTEETLA CREEK BASIN (GRAHAM COUNTY, N. C.).

Area.—Total, 7 square miles; cleared, 0.10 square mile; wooded, 6.90 square miles.

Surface.—Steep mountain slopes. Bottom land almost entirely wanting. A few small coves, perhaps 300 acres of which are arable.

Soil.—Loam, fertile wherever moist.

Humus and litter.—Scant on south slopes. A medium amount on north exposures.

Agricultural value.—Slight, except for fruit, which grows remarkably well.

Timber trees.—Poplar, 2 per cent; ash, 1 per cent; cherry, 1 per cent; white oak, 18 per cent; chestnut oak, 16 per cent; black oak, 5 per cent; red oak, 10 per cent; chestnut, 20 per cent; hemlock, 10 per cent; sugar maple, 5 per cent; peawood, 1 per cent; linn, 1 per cent; buckeye, 1 per cent; white pine, 1 per cent; cucumber, 2 per cent; others together, 6 per cent.

Yield.—Log timber, 35,840 M feet B. M.; small wood, 89,600 cords.

Demand.—Poplar stumpage is valued at $2 per thousand feet.

Accessibility.—A long distance from railroad at present. The mountain slopes are long and steep, but otherwise not difficult for logging operations.

Cutting.—Logging operations have reached about 1 mile above the mouth of the stream.

Fire.—Very common. The pasture has been much reduced by them, especially by those of late spring and early summer.

Reproduction.—Free, except where burned and pastured. Much white pine is coming in.

Second growth.—Vigorous, except where reduced by fire. There are many saplings on the north slopes; very few on the south.

Undergrowth.—Very scant. Too much fire and grazing.

Rate of growth.—Rapid wherever there is sufficient moisture.

Water power.—Abundant where Little Santeetla joins the main stream.

Prices of land.—From $3 to $4 per acre.

ATOA CREEK BASIN (GRAHAM COUNTY, N. C.).

Area.—Total, 7 square miles; cleared, 0.83 square mile; wooded, 6.17 square miles.

Surface.—The upper portion of the basin is steep. The slopes on the lower portion are mostly moderate enough to be arable. The bottom of the valley is frequently a quarter of a mile wide.

Soil.—Light loam. Fertile in coves and on bottoms only. Ridges poor.

Humus and litter.—Light, except in coves.

Agricultural value.—The narrow bottom lands only are worth cultivating.

Timber trees.—Chestnut, 15 per cent; white oak, 15 per cent; red oak, 6 per cent; black oak, 5 per cent; chestnut oak, 10 per cent; hickory, 5 per cent; cucumber, 5 per cent; linn, 5 per cent; sugar maple, 5 per cent; red maple, 8 per cent; buckeye, 10 per cent; poplar, 2 per cent.

Yield.—Log timber, 8,000 M feet B. M.; small wood, 59,700 cords.

Demand.—The best log timber is worth about $1 per thousand feet on the stump.

Accessibility.—A wagon road now leads across the mountain to Andrews, about 10 miles distant from the remotest part of the valley.

Cutting.—The lower portion of the valley has been quite thoroughly culled, both for the market and for local use.

Fire.—Fires are repeatedly set in the spring. The brush is reduced and the trees are frequently scarred.

Reproduction.—Restrained by fire and grazing.

Second growth.—Not promising on the ridges, but abundant on some wood lots.

Undergrowth.—Light.

Rate of growth.—Medium.

Water power.—The stream is too small to furnish much power.

Prices of land.—Ridge land is said to be worth 50 cents to $1 per acre. The best farm lands are held at $10 per acre.

LONG CREEK DISTRICT (GRAHAM COUNTY, N. C.).

Boundaries.—The divides comprising the entire drainage basin of Long Creek above Robbinsville, excepting Atoa Creek.

Area.—Total, 6 square miles; cleared, 0.67 square mile; wooded, 5.33 square miles.

Surface.—The slopes are moderate, except about the head of the stream, where they are very steep and rocky. Some 600 acres are smooth enough to be arable.

Soil.—Light on ridges; deep, dark loam in coves; sandy loam along the stream bottom.

Humus and litter.—In moderate quantity.

Agricultural value.—Only the stream bottoms and coves and some saddles on the mountain ridges are worth cultivating.

Timber trees.—Chestnut, 30 per cent; chestnut oak, 5 per cent; other oaks, 50 per cent; hickory, 5 per cent; ash, cherry, and poplar, 5 per cent; other species together, 5 per cent.

Yield.—Log timber, 10,230 M feet B. M.; small wood, 61,380 cords.

Demand.—The best of the timber could be bought for $1 per thousand feet on the stump.

Accessibility.—The wagon road leads over the mountain to the railroad at Andrews, a distance of about 12 miles from the remotest part of this tract.

Cutting.—The more accessible portions of the whole area have been culled.

A. TRANSPORTING LUMBER BY WATER.

B. FLOOD DAMAGES TO RAILROAD AND MINING SETTLEMENT, KEYSTONE, W. VA.

The lumber has been sawed by portable mills, and what has not been demanded for local use has been hauled to the railroad at Andrews.

Fire.—Fires have been very common.

Reproduction.—Free, except where much burned and closely grazed.

Second growth.—The number of saplings is becoming deficient on account of the numerous fires.

Undergrowth.—Very little.

Rate of growth.—Rapid.

Water power.—The stream is too small for much power. Near the mouth of Atoa Creek it was 20 feet wide and 6 inches deep with a rapid current at the end of summer.

Ownership.—This land is principally held by residents.

Prices of land.—From $1 to $3 per acre.

BUFFALO AND COCHRAN CREEK BASINS (GRAHAM COUNTY, N. C.).

Area.—Total, 13 square miles; cleared, 2.60 square miles; wooded, 10.40 square miles.

Surface.—Rolling to mountainous.

Soil.—Fertile on the bottoms and in coves. Ridges poor.

Humus and litter.—Light.

Agricultural value.—Only small areas in the bottoms and coves are fairly productive. Most of the fields are worn out.

Timber trees.—The oaks constitute about 60 per cent of the forest. Chestnut, hickory, ash, and the maples, with a few hemlock and white pine, constitute about 30 per cent, while poplar, cherry, cucumber, linn, buckeye, and others constitute the remainder.

Yield.—Log timber, 7,500 M feet B. M.; small wood, 88,320 cords.

Demand.—One dollar per thousand feet on the stump is considered a good price.

Accessibility.—Wagon roads lead to the upper portions of the valleys, and the mountain slopes are not especially difficult of access. There is but little underbrush.

Cutting.—The more accessible portions have been thoroughly culled for local use, while the best timber of nearly all the tract has been taken out for the market.

Fire.—Nearly all of the tract is frequently burned over.

Reproduction.—Abundant where fire and grazing are prevented.

Second growth.—Saplings are quite abundant on the isolated wood lots, but

on the mountains, especially on the ridges where fires have been prevalent for many years, there are but few.

Undergrowth.—Very little. It has been reduced by fire and grazing.

Rate of growth.—Medium. Most of the oaks add about 1 inch to their diameters in eight years.

Water power.—There are several locations where limited power could be secured. Buffalo Creek, near its mouth, about October 1, 1900, was 25 feet wide and 1 foot deep and moderately rapid.

Ownership.—Nearly all of the tract is held by residents. Other holdings are not large.

Prices of land.—The best farm lands could be bought for $5 per acre.

MOUNTAIN CREEK BASIN (GRAHAM COUNTY, N. C.).

Area.—Total, 8 square miles; cleared, 0.66 square miles; wooded, 7.34 square miles.

Surface.—Rolling to mountainous.

Soil.—Fertile red loam in the lowlands, but light and poor on the ridges.

Humus and litter.—Very scant.

Agricultural value.—Corn, grass, grain, and fruits yield fair crops.

Timber trees.—The oaks, chestnut, hickory, cucumber, linn, poplar, etc., are in very nearly the same proportion as in Buffalo and Cochran Creek basins.

Yield.—Log timber, 12,210 M feet B. M.; small wood, 44,800 cords.

Demand.—On account of remoteness from railroad, $1 per thousand feet on the stump is considered a good price.

Accessibility.—The central point of this tract is about 16 miles from the railroad at Nantahala, to which point lumber is hauled by wagon. The mountain sides are not especially difficult of access.

Cutting.—Much culling has been done, principally for local use.

Fires.—Annual fires are the rule, and the forest shows the effect in injured trees and scant underbrush.

Reproduction.—Free on the few tracts where fire has not prevented.

Second growth.—Dense stands of saplings are found on wood lots where protected from fire by clearings. On the mountains saplings are not abundant.

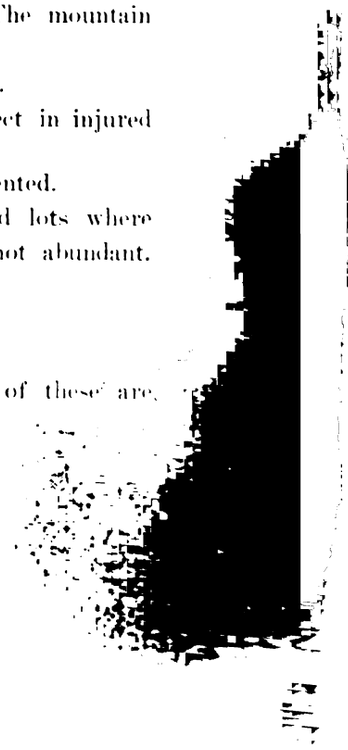
Undergrowth.—Very little, owing to fire and grazing.

Rate of growth.—Medium.

Water power.—Limited; streams are small.

Ownership.—The tract is divided into small holdings. Most of these are held by residents.

Prices of land.—From $1 to $10 per acre.



SWEETWATER CREEK BASIN (GRAHAM COUNTY, N. C.).

Area.—Total, 12 square miles; cleared, 3.13 square miles; wooded, 8.87 square miles.

Surface.—Hilly to mountainous.

Soil.—Fertile, red loam in the valley, but poor on the ridges.

Humus and litter.—Scant.

Agricultural value.—Corn, grass, grain, and fruits yield fairly well on the best lands with northern exposure.

Timber trees.—The same as in Buffalo and Cockran Creek basins.

Yield.—Log timber, 6,400 M feet B. M.; small wood, 64,600 cords.

Demand.—One dollar per thousand feet is considered a good stumpage price.

Accessibility.—Not difficult of access.

Cutting.—Most of the area has been culled over, principally for local use.

Fire.—Frequent.

Reproduction.—Scant.

Second growth.—Deficient.

Undergrowth.—Light.

Rate of growth.—Medium.

Water power.—Limited. There are sites for several small mills along the lower portion of the stream.

Ownership.—Small holdings by residents are the rule.

Prices of land.—From $1 to $5 per acre.

TALLULAH VALLEY (GRAHAM COUNTY, N. C.).

Boundaries.—The divides, including the entire drainage basin above that of Long Creek on the west and Sweetwater Creek on the east.

Area.—Total, 80 square miles; cleared, 3.80 square miles; wooded, 76.20 square miles.

Surface.—Rolling to hilly and mountainous.

Soil.—Fertile in coves and lowlands, light on the ridges.

Humus and litter.—Scant, except on the lower portion of north slopes.

Agricultural value.—Good crops of corn, grass, grain, and fruits are grown on the bottoms and on some of the lower mountain slopes.

Timber trees.—White oak, black oak, chestnut oak, red oak, Texas oak, post oak, scarlet oak, buckeye, linn, hickory, cucumber, birch, the maples, poplar, ash, white pine, and hemlock.

Yield.—Log timber, 41,200 M feet B. M.; small wood, 512,000 cords.

Demand.—Two dollars per thousand feet on the stump is a common price for the best of the log timber.

Accessibility.—The remotest part of the tract is about 15 miles, by wagon road, from the railroad at Nantahala. Some of the mountain slopes are very steep and difficult of access, but the greater portion can be logged without much difficulty.

Cutting.—Very nearly all of the tract has been culled of its best timber. Much also has been cut for local use.

Fire.—Frequent. The humus and undergrowth are much reduced.

Reproduction.—Free on some of the damper portions. Deficient elsewhere.

Second growth.—Deficient. The effect of fire and grazing is evident, though some north coves are well supplied.

Undergrowth.—There are some dense patches of laurel along streams and in moist coves, but elsewhere there is no difficulty in taking horses through the woods.

Rate of growth.—Generally rapid.

Water power.—Abundant in the lower portion of this valley.

Ownership.—Several thousand acres of the upper portion of the valley are held by nonresidents, who lease the farm lands. Most of the remainder is held by resident farmers.

Prices of land.—From $1 to $15 per acre.

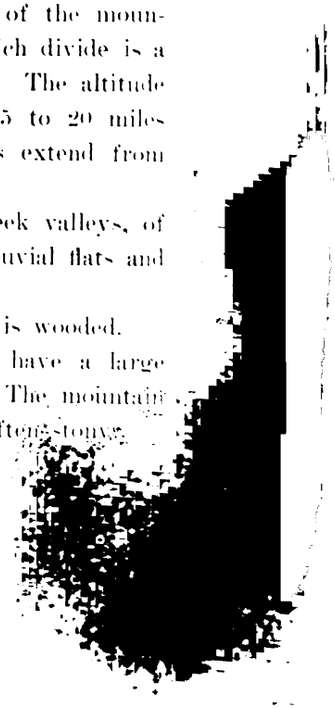
HIWASSEE RIVER BASIN.

Topography.—This drainage is tributary to Tennessee River, which the Hiwassee joins above Chattanooga, and comprises the eastern tributaries of Hiwassee River above Murphy, equivalent to the western slope of the mountainous divide between Little Tennessee and Hiwassee rivers, which divide is a cross range between the Blue Ridge and the Smoky Mountains. The altitude of this tract ranges between 1,500 and 5,000 feet. Spurs from 5 to 20 miles long reach from the divide toward the river, while deep valleys extend from the river far into the mountains.

The mountain sides are steep and often rocky, while the creek valleys, of which there are six prominent ones, have considerable areas of alluvial flats and rolling foothills.

The basin has an area of 223,456 acres, of which 71 per cent is wooded.

Soil.—Even the alluvial flats along the river and creeks have a large proportion of clay, and the foothills are almost entirely clay. The mountain sides are loamy, the coves are very fertile, the ridges light and often stony.



Agriculture.—Corn is the principal grain crop. Grass does well on low alluvial lands and in mountain coves, but burns out on the foothills. There are some fine farms on Valley River, Peachtree, Tusquitee, Shooting, Tiger, and Hightower creeks, but large areas of hill land are worn out and abandoned to broom grass.

Erosion.—This basin, or part of it, seems unusually liable to floods, as is shown by the cutting of banks and the washing of fields. About the head of Peachtree Creek, in 1900, several "waterspouts" are said to have occurred at one time, and the waters from these, combining, formed a torrent that swept across fields and roads, doing great damage. Evidences of similar floods and of great erosion on old fields are to be found in almost every mile of travel.

The uselessness of clearing the ridge lands has been discovered by the farmers, and no advances of cleared land have recently been made toward the mountains, but many old fields lie wasted and wearing away, scantily patched with broom grass, persimmon, and sassafras.

The forest.—The mountains and spurs are principally forest covered, although here and there clearings have been made in coves and along the tributary creeks. The larger creek valleys and the river valley are principally cleared. The basin contains 286,856 M feet B. M. and 2,557,536 cords of small wood.

In this region is found a suggestion of the difference between the forest of the highlands northwest of the Blue Ridge and that of the southern slope of the Blue Ridge. In passing from the highlands the region of most vigorous tree growth is left and the pine regions are approached. Oaks and hickories are more numerous, but are shorter and smaller. Hemlock and white pine are less abundant, the birches and hard maples become rare, and the southern red maple, pitch pine, and shortleaf pine more abundant. The proportions of timber species are as follows:

Proportions of timber species in Hiwassee River basin.

	Per cent.
Oaks	55
Linn	1
Maple	1
Shortleaf pine	1
Chestnut	18
Black pine	1
Black gum	2
Hickory	5
Other species	14
White pine	1
Beech	1

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Condition.—In condition, too, there is a noticeable contrast. Fires have been more prevalent and have kept decaying vegetation thoroughly consumed. They have killed less timber, but have done no less damage by preventing new growth.

On isolated wood lots and near clearings are many tracts of thrifty saplings, but the general forest condition, owing to fire and grazing, is inferior to that of the mountains northward.

The first and essential step toward the improvement of this forest would be the prevention of fire. Much of the stand is now so thin that thinnings need not be made at once.

Sprouts and seedlings will start freely, and the forest will grow well as soon as the forest soil has reached natural condition again.

But few cattle are ranged in the mountains now, as the grazing has been so reduced by repeated fires.

VALLEY RIVER BASIN ABOVE ANDREWS (CHEROKEE COUNTY, N. C.).

Boundaries.—The divides, including the entire drainage basin east of the basin of Junalaska Creek and the ridge leading north from the mouth of that stream.

Area.—Total, 40 square miles, cleared, 4 square miles; wooded, 36 square miles.

Surface.—About 5 square miles in the bottom and on the lower slopes of the valleys are smooth enough to be arable. The mountain slopes, especially those to the southward, are steep and rocky.

Soil.—In the bottoms loam; on the lower slopes red-clay loam, and in the coves deep, dark mold.

Humus and litter.—Not abundant, except in a few north coves.

Agricultural value.—Corn yields 40 bushels per acre on the best of the bottoms, while in the coves grass, vegetables, and fruit yield well.

Timber trees.—Oaks, 75 per cent; chestnut, 10 per cent; hickory, 2 per cent; gum, 2 per cent; maple, 2 per cent; cucumber, ash, cherry, and poplar together, 5 per cent; others, 4 per cent.

Yield.—Log timber, 32,259 M feet B. M.; small wood, 188,973 cords.

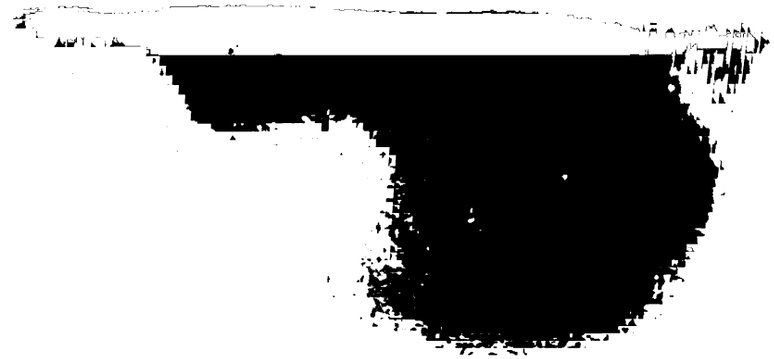
Demand.—Log timber brings from $1 to $2 per thousand feet on the stump, and bark has a stumpage value of $1 per cord.

Accessibility.—A wagon road leads through the valley from Marble Gap to Andrews along the mountain slope south of the railway. The portion north of the railway is more difficult of access. There are very few roads of any sort, and the mountain side is steep and rocky.

Cutting.—Large amounts of log timber have been taken out for local use.

A. UNNECESSARY FOREST DESTRUCTION ALONG A SNAKING TRAIL.

B. SECOND GROWTH OF OAK, FRENCH BROAD VALLEY, SOUTH OF ASHEVILLE, N. C.



During the past year the new tannery at Andrews has bought about $40,000 worth of chestnut-oak bark. A small amount of oak and hemlock bark has been shipped out of the valley by rail. The log timber, from which the bark has been peeled, is left on the ground.

Fire.—Repeated fires have reduced the undergrowth and the humus, and even seriously injured the pasturage, especially on southward slopes.

Reproduction.—Free on unburned cuttings. Old burns are slowly covered by persimmon, oak, hickory, etc.

Second growth.—Saplings are abundant where fires have not been prevalent for a long time.

Undergrowth.—Scant. There has been too much fire in recent years.

Rate of growth.—Medium.

Water power.—Limited, yet there are many sites for sawmills along the lower portion of the stream.

Prices of land.—Fifty dollars per acre is asked for the best farm land in this valley, but the mountain lands could be bought at a nominal figure.

VALLEY RIVER BASIN BELOW ANDREWS (CHEROKEE COUNTY, N. C.).

Boundaries.—This tract comprises all of that portion of the Valley River drainage basin east of Tomotla and west of the former tract, lying north of Valley River and that portion south of Valley River limited by the eastern divide of Junalaska Creek and the western divide of Vengeance Creek.

Area.—Total, 39 square miles; cleared, 4.80 square miles; wooded, 34.20 square miles.

Surface.—Moderate mountain slopes, rolling foothills, and wide, cultivated bottom land.

Soil.—The bottoms are fertile loam. The lower slopes are red clayey loam. Most of the ridges are light and poor.

Agricultural value.—The bottom lands often yield 40 bushels of corn per acre. Vegetables do well, but hay and fruit do not thrive except high on the mountain sides.

Timber trees.—Oaks, 70 per cent; chestnut, 10 per cent; hickory, 3 per cent; gum, 2 per cent; cucumber, 2 per cent; maple, 1 per cent; ash, poplar, cherry, and locust together, 5 per cent; buckeye, 1 per cent; others, 6 per cent.

Yield.—Log timber, 26,120 M feet B. M.; small wood, 374,400 cords.

Demand.—Poplar, ash, cucumber, and cherry are sawed for the market, and bring from $1 to $2 per thousand feet. A market for bark has been developed by the new tannery at Andrews, where chestnut-oak bark brings $7 per cord.

Accessibility.—Easy of access. A railroad traverses the whole length of the valley, and wagon roads lead up most of the tributaries.

Cutting.—Very little log timber is cut, except for local use. Bark is the principal material marketed at present.

Fires.—Fires have been prevalent for many years.

Reproduction.—Free where not repeatedly burned. Old fields are soon recovered with persimmon and oak.

Second growth.—Saplings are abundant on some of the moist culled lands, but are scant on the ridges.

Rate of growth.—Medium.

Water power.—Valley River would supply a number of mills, but the flow is very unsteady and difficult to control.

Ownership.—Several large tracts are held by nonresidents, but most of the area, especially the farm lands, is divided into small holdings, owned by residents.

Prices of lands.—Fifty dollars per acre is asked for the best bottom lands, but some of the mountain lands could be bought for 50 cents to $1 per acre.

PEACHTREE CREEK DISTRICT (CHEROKEE COUNTY, N. C.).

Boundaries.—The divides, including the entire drainage basin of Peachtree Creek east of the Hiwassee road; also that portion of Cherokee County lying between the Hiwassee road (south of Peachtree Creek) and the eastern boundary of Cherokee County, and north of Hiwassee River.

Area.—Total, 11 square miles; cleared, 1.33 square miles; wooded, 9.67 square miles.

Surface.—The lower portion of the valley has arable bottom land about three-fourths of a mile wide. Three miles above the Hiwassee road it becomes narrow and interrupted. The mountain slopes are steep.

Soil.—The bottoms are fertile loam. The ridges are light and poor.

Humus and litter.—Scant, owing to fires and grazing.

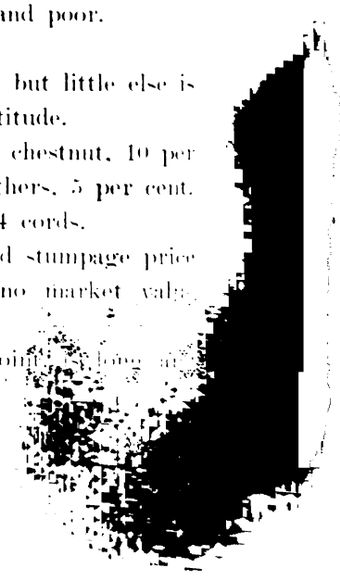
Agricultural value.—The bottoms yield good crops of corn, but little else is grown, as vegetables and hay are not productive in this low altitude.

Timber trees.—Oaks, 75 per cent; the hickories, 5 per cent; chestnut, 10 per cent; cucumber, ash, poplar, and cherry together, 5 per cent; others, 5 per cent.

Yield.—Log timber, 7,680 M feet B. M.; small wood, 74,244 cords.

Demand.—One dollar per thousand feet is considered a good stumpage price for the best of the log timber. The greater portion has no market value whatever.

Accessibility.—The wagon road to Murphy, the shipping point, is along a hilly, but the forest itself is not especially difficult of access.



Cutting.—A small mill is now operated, cutting what logs may be brought to it for sale by the farmers and mountaineers. The bottoms have been cleared of valuable log timber to make way for farming. The lower mountain slopes have been considerably culled for local use.

Fire.—Many fires have seriously injured the greater portion of the forest. The western hills are reduced almost to brush land.

Reproduction.—Reproduction is free on the cuttings that have not been repeatedly burned. The old clearings are being covered slowly by persimmon, sassafras, the oaks, and scrub pine.

Second growth.—Deficient, owing to fire.

Undergrowth.—Very light.

Rate of growth.—Slow.

Water power.—The creek in October, 1900, was 25 feet wide and 6 inches deep and quite rapid. It is subject to great floods and is of questionable value for power.

Ownership.—Nearly all of the tract is held by the several residents of this valley and the adjoining lower region.

Prices of land.—The best farm land is valued at $20 per acre, but the mountain lands are held at a very low figure. Fifty cents per acre might buy some large tracts.

FIRES CREEK DISTRICT (CLAY COUNTY, N. C.).

Boundaries.—The divides including the entire drainage basin of this stream and that portion of the Hiawassee River drainage in Clay County below Fires Creek.

Area.—Total, 23 square miles; cleared, 1.33 square miles; wooded, 21.67 square miles.

Surface.—Only about 5 square miles are smooth enough to be arable. The remainder consists of mountain slopes, usually steep and rocky.

Soil.—The bottoms are fairly fertile, but the soil on the ridges is light and poor.

Humus and litter.—Scant, owing to customary fires and grazing.

Agricultural value.—Corn crops are seldom over 20 bushels per acre, and hay and fruit yield well only on north slopes. The difficulty of cultivation and access renders this land of little value for agriculture.

Timber trees.—Substantially the same as on Peachtree Creek.

Yield.—Log timber, 24,747 M feet B. M.; small wood, 208,020 cords.

Demand.—The best and most accessible poplar, ash, cherry, and cucumber are sold for $1 per thousand feet on the stump. Other log timber is not salable on the stump.

Accessibility.—The center of the valley is about 16 miles by rough wagon road from the railroad. The slopes of the valley are steep and frequently rocky. Logging in the usual way would be difficult, but there are no serious obstacles to logging by rail.

Cutting.—Poplar, ash, cherry, and cucumber have been cut near the main stream and well toward the head of the main valley. The logs have been floated in the creek with some difficulty.

Fire.—Fires have been so frequent that the undergrowth and the pasture are greatly reduced. Some large areas were seen where there was absolutely no vegetation under the trees.

Reproduction.—The cuttings are readily restocked. On old clearings persimmon, oak, and pine appear slowly.

Second growth.—Saplings are in moderate abundance, but there are very few small ones, owing to the increase of fires in recent years.

Undergrowth.—Very light; it is prevented by fires and grazing.

Rate of growth.—Moderate. The oaks make about 2 inches in diameter in ten years.

Water power.—Abundant. The creek was found 50 feet wide and 6 inches deep with a rapid fall, during the dry time in October, 1900.

Prices of land.—The best farm lands could be bought for $5 per acre. The price for mountain lands is nominal.

TUSQUITEE CREEK BASIN (CLAY COUNTY, N. C.).

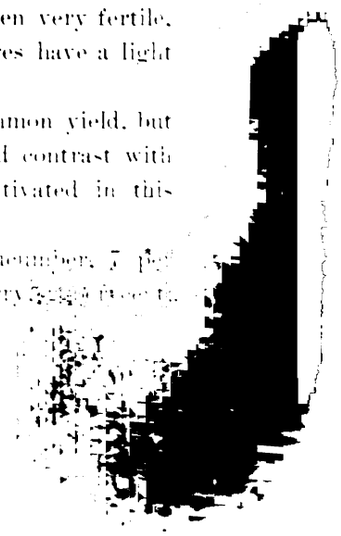
Area.—Total, 45 square miles; cleared, 4.50 square miles; wooded, 40.50 square miles.

Surface.—The bottom of the valley is about 1 mile wide up to a point about 5 miles from Hiwassee River. Above this point are interrupted areas of undulating to rolling bottom lands. The mountain slopes are not especially steep, though occasional cliffs may be seen from the valley.

Soil.—The soil of the bottom is loam, much of which has been very fertile, and some of which is now very productive. The slopes and ridges have a light soil, and are subject to drought and erosion.

Agricultural value.—Thirty bushels of corn per acre is a common yield, but hay requires much care, and fruits are liable to rot. In marked contrast with some of the region northward, the slopes and coves are not cultivated in this valley, the alluvial lands being preferred.

Timber trees.—Oaks, 70 per cent; chestnut, 10 per cent; cucumber, 7 per cent; linn, 1 per cent; buckeye, 2 per cent; poplar, ash, and cherry [illegible] per cent; hickory, 3 per cent; and others, 5 per cent.



Yield.—Log timber, 36,992 M feet B. M.; small wood, 207,360 cords.

Demand.—One dollar per thousand feet on the stump is considered a good price for floatable log timber.

Accessibility.—This valley is about 25 miles, by wagon road, from the nearest shipping point on the railroad. Otherwise, the land is not especially difficult of access. There is but little underbrush, and the surface is fairly smooth.

Cutting.—About 100,000 feet of log timber have been taken out by the Cherokee Lumber Company. Their operations are at a standstill, owing to the difficulty of transportation. Other cutting has been for local use only.

Fire.—Repeated fires have greatly reduced the forest or prevented its best development. The people claim that fires have greatly injured the mountain pasturage.

Reproduction.—Reproduction is free on cuttings where fire does not prevail. Old fields are slowly covered with persimmon, oak, and pine, with a small proportion of hickory.

Second growth.—Saplings are not as abundant as they should be, owing to the prevalence of fire.

Undergrowth.—Very scant, because the forest is frequently burned over and closely grazed.

Rate of growth.—Medium. It varies considerably, according to location, being quite rapid on north slopes, where moisture is abundant, but slow on ridges, which are subject to drought.

Water power.—Several valuable powers are on this stream, which, during the low water in October, 1900, was about 50 feet wide and 1 foot deep, with a fairly rapid current.

Prices of land.—The best bottom lands are valued at $50 per acre, while the mountain land could be bought for $1, or less, per acre.

SHOOTING CREEK DISTRICT (CLAY COUNTY, N. C.).

Boundaries.—The divides, including all of the area between the Tusquitee Creek and Bell Creek drainage basins, including several small areas draining directly into Hiwassee River.

Area.—Total, 50 square miles; cleared, 15 square miles; wooded, 35 square miles.

Surface.—The bottom lands, which are undulating to rolling, have an area of about 6 square miles. The lower mountain slopes are moderate, but the upper are precipitous on Vineyard and Chunky Gal mountains.

Soil.—The lowlands were once fertile, but are now considerably depleted.

The soil of the ridges is light and poor; that on the mountain slopes usually varies, according to its exposure to fire and erosion.

Humus and litter.—Light.

Agricultural value.—Corn crops are very light, and grass is difficult to grow. Fruits do well on the mountain slopes, but the general appearance of the valley is not attractive to farmers.

Timber trees.—Oaks, 70 per cent; chestnut, 8 per cent; hickory, 3 per cent; linn, 1 per cent; cucumber, 2 per cent; gum, 5 per cent; poplar, ash, and cherry together, 5 per cent; buckeye, 3 per cent; the maples, 3 per cent.

Yield.—Log timber, 40,000 M feet B. M.; small wood, 448,000 cords.

Demand.—This land is so far from the market that the prices are nominal. The best trees bring only $1 per thousand feet on the stump.

Accessibility.—There is no special difficulty in logging, but the road to market is so long and rough that there is no profit in taking out the timber.

Cutting.—About 200,000 feet have been taken out, and there has been other cutting for local use.

Fire. Fires are frequent, and show their effect in the depletion of the forest.

Reproduction.—Free where fires and grazing are prevented. Even on old pastures persimmon and pine are coming in freely.

Second growth.—Deficient, because there has been much fire.

Undergrowth.—Much reduced by fire and grazing, though some laurel patches remain along streams on north slopes.

Rate of growth.—Slow; the oaks commonly make 2 inches in diameter in ten years.

Water power—The creek near Elf is about 50 feet wide and 1½ feet deep, with a fair current. Several very favorable sites for power occur along the lower portion of Shooting Creek.

Prices of land.—The highest price for farm land is $15 per acre. The mountain lands can be bought for $1 per acre, or less.

BELL CREEK DISTRICT (UNION COUNTY, GA.).

Boundaries.—The divides, including all of the area between the ridge from Hiwassee to Eagle Mountain and the southern divide of the Shooting Creek basin.

Area.—Total, 15 square miles; cleared, 5.50 square miles; wooded, 9.50 square miles.

Surface.—The lowlands, comprising about 5 square miles, are rolling to hilly. The mountain slopes are usually moderate, but in some places are precipitous.

TALLULAH FALLS, GEORGIA.

Soil.—Light, except on alluvial bottoms and deep, north coves.

Humus and litter.—Scant, owing to repeated fires.

Agricultural value.—Slight. Twenty bushels of corn per acre is considered a good crop, and hay and fruits do not thrive, except in the higher coves.

Timber trees.—Oaks, 75 per cent; chestnut, 5 per cent; hickory, 3 per cent; poplar, ash, cherry, cucumber, and linn, 10 per cent; others, 7 per cent.

Yield.—Log timber, 10,000 M feet B. M.; small wood, 72,960 cords.

Demand.—The best log timber brings only $1 per thousand feet on the stump, and there is very little demand at that price.

Accessibility.—The land is not difficult of access, but the road to market is long and rough, and on that account there is no profit in handling log timber except that which has fancy grain.

Cutting.—Except figured woods, the only cutting has been for local use.

Fire.—Repeated light fires have greatly depleted the forest.

Reproduction.—There is too much fire and grazing for the reproduction necessary to keep the forest in good condition.

Second growth.—Scant. There has been too much fire.

Undergrowth.—Reduced by fire and grazing.

Rate of growth.—The oaks usually add about 2 inches in diameter in ten years.

Water power.—Limited. The stream during the low water in October was 15 feet wide and 6 inches deep, with moderate current. There are several favorable locations for dams.

Ownership.—Most of the land is held in small tracts by residents of the valley.

Prices of land.—The best timber lands are valued at $25 per acre, while the mountain lands can be bought for about 50 cents per acre.

HIGHTOWER CREEK DISTRICT (TOWNS COUNTY, GA.).

Boundaries.—The divides, including the entire drainage of Hiwassee River from the east between Hiwassee and a point about one-forth of a mile south of the mouth of Hightower Creek, except the basin of Swallow Creek.

Area.—Total, 32 square miles; cleared 7 square miles; wooded, 25 square miles.

Surface.—About 9 square miles of the lower portion of the valley are smooth enough to be arable. The lower portions of the mountain slopes are moderate but the upper portions are quite steep, often precipitous.

Soil.—The alluvial lands of the bottom are fertile, but the ridges have a

light soil and are hardly worth cultivating. Some rich, dark loam is found in the coves, but such areas are small.

Humus and litter.—Scant, except in the north ravines and coves.

Agricultural value.—Twenty bushels of corn per acre is considered a good crop. In the lowlands little else can be grown. Grain and fruit succeed in the coves where the altitude is 2,500 feet or more, especially if the exposure is toward the north.

Timber trees.—The principal timber trees are the oaks, forming 60 per cent of the forest; chestnut, 15 per cent; hickory, 6 per cent; poplar, ash, cherry, walnut, and cucumber together, 10 per cent, and others, 9 per cent.

Yield.—Log timber, 25,956 M feet B. M.; small wood, 240,000 cords.

Demand.—The highest stumpage price is $1 per thousand feet. Many of the most valuable trees have been bought at 50 cents per tree and left standing.

Accessibility.—Except for the long distance to shipping points, there is no especial difficulty in logging this land.

Cutting.—There has been no cutting, except for local use. Large amounts of best timber have been cut and burned in clearing land.

Fire.—Frequent light fires have reduced the undergrowth and the pasturage, at the same time injuring many of the timber trees and preventing the growth of young stock.

Reproduction.—Abundant, except where fires and grazing are severe. Old clearings are slowly restocked with persimmon, sassafras, the oaks, and the pines.

Second growth.—In some localities, usually where best protected by fire, saplings are abundant, but as a rule there are not enough to fully occupy the land if the mature trees were cut.

Undergrowth.—Reduced by fire and grazing. Very little brush, except on damp areas.

Rate of growth.—Moderate.

Water power.—Hightower Creek, near its mouth, was 35 feet wide and 1 foot deep, with a rapid current during a dry time in October, 1900.

Ownership.—Nearly all of the tract is divided into numerous small holdings by residents of the valley.

Prices of land.—Thirty dollars per acre is asked for the best farm lands. Much of the mountain land could be bought for 50 cents per acre.

SWALLOW CREEK BASIN (TOWNS COUNTY, GA.).

Area.—Total, 8 square miles; cleared, 1 square mile; wooded, 7 square miles.

Surface.—Most of the lower slopes are moderate, but the middle and upper slopes are steep and often rocky.

Soil.—Light, except in the coves and on the alluvial portion of the narrow bottom.

Humas and litter.—Abundant in the several deep coves in the upper portion of the basin. The northward slopes are fairly covered, while there is but little on the higher ridges.

Agricultural value.—Corn is the principal crop of the lower portion of the valley. Twenty bushels per acre is considered a good crop. In the higher portion fruit, vegetables, hay, and grain do well.

Timber trees.—Black oak, white oak, chestnut oak, red oak, Texas oak, and Spanish oak, mentioned in the order of their abundance, together constitute about 80 per cent of the forest; chestnut forms about 10 per cent, while poplar, ash cucumber, cherry, and others form the remainder.

Yield.—Log timber, 8,675 M feet B. M.; small wood, 80,640 cords.

Demand.—Nearly all of the poplar, ash, cherry, and walnut was bought six to eight years ago at 50 cents per tree, and left standing.

Accessibility.—Difficult. The timber is not only a long way from market, but the ground on which it stands is steep and rocky, and frequently very brushy.

Cutting.—No cutting has been done, except for local use, in fencing or building.

Fire.—This tract is much less subject to fires than others of the region, because the exposure is toward the north, and the upper portion of the basin is isolated.

Reproduction.—Free, except as affected by fire and grazing.

Second growth.—Saplings are abundant, except on the ridges.

Undergrowth.—This tract is more brushy than any other in the region. Near the streams there is much laurel, and the slopes are fairly covered with seedlings of timber trees, or the several species of brush, especially huckleberry and azalea.

Rate of growth.—The oaks add about 2 inches in diamenter in eight years.

Water power.—Swallow Creek, at its mouth, was about 20 feet wide and 8 inches deep, and quite rapid when seen in October, 1900.

Ownership.—Most of the tract is divided into small holdings by residents of the basin.

Prices of lands.—The best farms could be bought for $10 per acre, while much of the mountain land could be bought for 50 cents per acre.

TALLULAH-CHATTOOGA RIVER BASIN.

Topography.—This tract drains into the Atlantic through Savannah River. Lying on the southeastern slope of the Blue Ridge, the altitude varies from 5,500 feet on Standing Indian, 5,100 feet on Ridgepole, 4,769 on Scaly Mountain,

and 4,931 feet on Whitesides to 1,000 feet, at the junction of Tallulah and Chattooga rivers. Many of the peaks and spurs are extremely bold, and there are numerous deep gorges and canyons, and along the creeks, especially along the upper Tallulah and its tributaries, are alluvial bottoms of considerable area. Nearly all of the cleared land (11 per cent of entire tract) of this system is on creek bottoms.

The tract has an area of 348,588 acres, of which 89 per cent is wooded.

Soil.—Derived from gneiss and granite, the soil is generally of good physical composition, except in the foothills, where a stiff, red clay predominates, which erodes readily and is hard to cultivate.

The bottom lands are loamy and fairly fertile, but the ridges have been so much burned and washed that on them the soil is light colored, thin, and poor.

Agriculture.—Corn is the principal crop. Grass, except in the higher altitudes, does not hold. Sweet potatoes, cane, and cotton are grown along the southern limit of this tract. Peaches do well in the lower altitudes, and apples are grown on the mountains.

Erosion.—The impervious clays of the foothills are frequently barren and gullied, because left uncovered. The mountain ridges have many stones and pebbles in their soil and resist erosion much better than the clays, but this advantage is counteracted by the steepness of their slopes, and the bed of every rivulet is eroded to the underlying rock. The creek bottoms are hardly less liable to damage. Sudden downpours of rain (11 inches have been known to fall in forty-eight hours) often cause such rises in the creeks as to cover the fields with gravel or cut them away.

The forest.—All this tract is forest land, except the creek bottoms and a few mountain coves, which have been cleared, and together amount to 11 per cent of the area. The denser portions are in the coves at the higher altitudes. The tract contains 505,050 M feet B. M. of log timber, and 4,601,745 cords of small wood.

There is a noticeable contrast between the forests of the interior mountain region and those about the headwaters of the Tallulah and Chattooga rivers. Here the oaks are in greater predominance, and the hickories and southern pines are more abundant, while beech, birch, maple, buckeye, and other lovers of cool air and abundant moisture are notably less. White pine and hemlock hold to the higher altitudes, but are notably absent along the foothills.

Proportions of timber species in Tallulah-Chattooga River basin.

	Per cent.
Oaks	
Hemlock	
Hickory	
Shortleaf pine	

Proportions of timber species in Tallulah-Chattooga River basin—Continued.

	Per cent.
Chestnut	10
Black pine	3
Black gum	3
Locust	1
Other species	11
White pine	2
Birch	1

In condition also the forest is inferior to that of the plateau. The injuries by fire are greater. The rate of growth is further retarded by drought and probably by occasional spring frosts, which kill the buds and young leaves. The greater portion is in the condition of a natural forest, with many old, crooked, fire scarred and otherwise defective trees and inferior species, and with subordinate saplings, crooked and retarded. Because of prevalent fires the stand is imperfect, many spaces being covered with mere brush where a stand of good timber is possible. Along the line of the old railroad grade from Walhalla to Rabun Gap, much burning was done at the time of grading; this area is now covered with a dense stand of saplings, principally oak and hickory.

The absence of protection from fire on its dry slopes would be the main difficulty in bringing this forest into good condition. Sprouts and seedlings spring up quickly where fire can be prevented.

The effect of the no-fence law is plainly noticeable south of Chattooga River, where the forest is more severely injured by fires, which are there fiercer because of more combustible material.

DICKS CREEK BASIN (RABUN COUNTY, GA.).

Area.—Total, 10.4 square miles; cleared, 1.9 square miles; wooded, 8.5 square miles.

Surface.—A narrow strip of bottom land (about 2 square miles), smooth enough to be arable, lies along the stream, while the slopes are steep and often rocky.

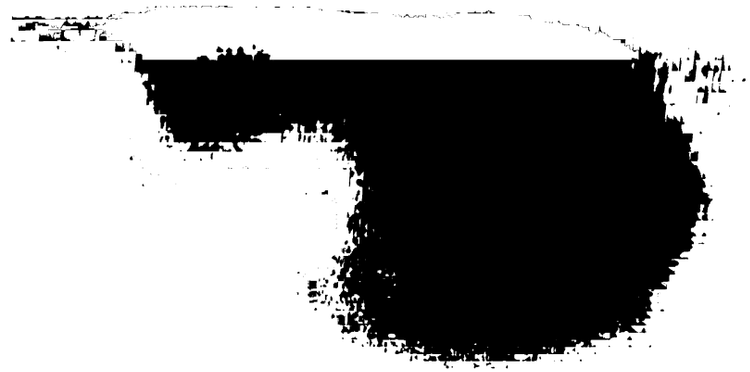
Soil.—The alluvial bottoms are fertile; the ridge land is poor. Much of the soil is red, clayey loam.

Humus and litter.—Scant, except along the lower slopes having eastward exposure.

Agricultural value.—The best land yields about 50 bushels of corn per acre, and in the upper portion of the valley hay and fruits do very well.

Timber trees.—Black oak, Texas oak, red oak, white oak, Spanish oak, hickory, chestnut, linn, cucumber, poplar, ash, cherry, walnut, and a few hemlock and pine.

Yield.—Log timber, 11,000 M feet B. M.; small wood, 66,000 cords.



Accessibility.—Except for the long distance to shipping points this land is not especially difficult of access.

Cutting.—No cutting has been done, except for local use.

Fire.—Fires are common, but their effect is not as noticeable here as in the valley of Dicks Creek.

Reproduction.—Free.

Second growth.—Saplings are abundant, except on the ridges and southern slopes.

Undergrowth.—Not abundant, except on the damper areas, as in the ravines and on lower slopes.

Rate of growth.—Not observed.

Water power.—Limited.

Ownership.—The holdings are divided among residents.

Prices of land.—Farm lands can be bought for $25 per acre, while the mountain lands are held at 50 cents to $2 per acre.

WILD CAT CREEK BASIN (RABUN COUNTY, GA.).

Area.—Total, 17 square miles; cleared, 2.43 square miles; wooded, 14.57 square miles.

Surface.—Rolling to mountainous.

Soil.—The alluvial bottoms and the coves are fertile.

Humus and litter.—Scant, except in north coves and ravines.

Agricultural value.—Corn yields well on the lowlands, and fruit and hay do well in the coves.

Timber trees.—The same conditions prevail as in Moccasin Creek Valley.

Yield.—Log timber, 22,939 M feet B. M.; small wood, 112,068 cords.

Demand.—The only demand is for local use. Even the best timber has a nominal stumpage price.

Accessibility.—Remote from market. Otherwise not difficult.

Cutting.—The only cutting has been for local use.

Fire.—Common. The ridges are burned over nearly every year. Many trees are injured, and the seedlings are prevented from developing.

Reproduction.—Free, except for fires and grazing.

Second growth.—Abundant, except on ridges, where much exposed to fire, drought, and grazing.

Rate of growth.—Medium.

Water power.—Limited.

Prices of land.—From 50 cents to $15 per acre.

SOQUE RIVER DISTRICT (HABERSHAM COUNTY, GA.).

Boundaries.—The Soque River on the west, the Wild Cat divide on the north, the Tallulah divide on the east, and the Northeastern Georgia Railway on the south.

Area.—Total, 68 square miles; cleared, 3.66 square miles; wooded, 64.34 square miles.

Surface.—A large portion (about 22 square miles) near the river is rolling, thence to the foot of the mountains is hilly, while the mountain slopes are steep and rocky, especially those of the Tallulah Ridge.

Soil.—Light, except on the few small alluvial bottoms, having an area of perhaps 3 square miles. The remainder has very little humus, and the forest is less vigorous than in the more fertile region northward.

Humus and litter.—Scant. The soil is almost invariably light colored, and the litter is consumed by the frequent fires.

Agricultural value.—Only the lowlands of the narrow valleys seem to be worth cultivating. Some few products might be grown on the ridges, such as cane or peaches, but this land can not be considered as truly agricultural.

Timber trees.—Pitch pine, shortleaf pine, the oaks, hickories, gum, and a great variety of other species of little value, except for fuel.

Yield.—Log timber, 57,600 M feet B. M.; small wood, 505,600 cords.

Demand.—No log timber is being marketed. The best poplar might possibly bring $1 per thousand feet on the stump.

Accessibility.—Easy, except that the distance to market is long and some of the higher mountains are steep and rocky.

Cutting.—A few mills are cutting for local use. A large proportion of the timber cut is pine, which is used for house lumber. Pitch pine, which has little or no market value, is highly esteemed here for flooring.

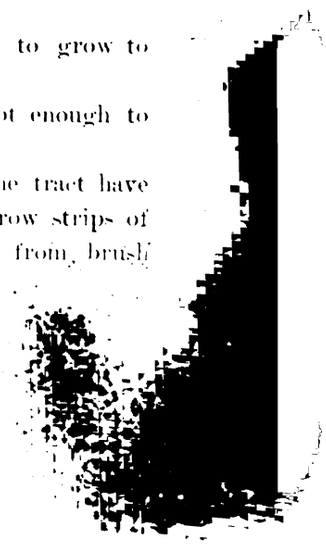
Fire.—Fires are very frequent, and the whole tract is burned over as often as sufficient material accumulates to support the fire.

Reproduction.—The seedlings start freely, but are rarely able to grow to maturity, owing to the frequent fires.

Second growth.—Saplings are fairly abundant, but there are not enough to restock the land were the mature trees cut.

Undergrowth.—Very scant. Fires and grazing on most of the tract have prevented the underbrush from accumulating. There are some narrow strips of laurel along the streams, but elsewhere the woods are almost free from brush and seedlings.

Rate of growth.—Not observed.



Water power.—Abundant along Soque River, but very light elsewhere.

Ownership.—Most of the land seems to be held by the residents of the vicinity.

Prices of land.—The best bottoms are valued at about $20 per acre. The best of the ridge and mountain land could be bought for $1 per acre.

TALLULAH RIVER BASIN BELOW TIMPSON CREEK (RABUN COUNTY, GA.).

Boundaries.—The divides, including all of the area draining into Tallulah River from the east between Burton and Tallulah Falls, except the Tiger Creek basin; also all of the area draining into Tallulah River from the West between Wild Cat basin and Tallulah Falls.

Area.—Total, 56 square miles; cleared, 8 square miles; wooded, 48 square miles.

Surface.—Along the river are 4 square miles of interrupted sandy bottom nearly level. There are also about 10 square miles of rolling land that is smooth enough to be arable. The remainder is hilly to mountainous. The lower portion of the valley is cut by the Tallulah Canyon, and is very rough and rocky.

Soil.—Variable. The alluvial bottoms are sandy. The adjoining low ridges are of red clay, while the higher slopes and ridges have a soil derived from the decomposition of rock in place. This latter is usually a light-colored loam.

Humus and litter.—Very light, owing to the frequent fires.

Agricultural value.—Only a small proportion of the land, about 12 square miles, is worth cultivating. The remainder should be kept as woodland.

Timber trees.—Shortleaf pine, pitch pine, white pine, and scrub pine, the oaks, of which there are many species, the hickories, gum (black and sweet), a few poplar, ash, cucumber, and buckeye in ravines, and red maple, linn, and several others compose a forest of great variety in species and development.

Yield.—Log timber, 51,837 M feet B. M.; small wood, 307,200 cords.

Demand.—Some of the best trees have been bought for 50 cents to $1 each, and left standing. Timber has a very slight stumpage value, owing to the long haul to market.

Accessibility.—Difficult, especially in the lower portion of the valley, from which the lumber taken out must be hauled, first, to the top of the surrounding ridges; thence, along these ridges to Tallulah Falls. The river, although having a large volume of water, is too rough to be drivable.

Cutting.—A few small mills are in operation. One has lately been established on Tiger Creek. The lumber from these mills is hauled to Tallulah Falls or distributed among the people of the valley for local use.

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Fire.—The land is burned over as often as material accumulates to support a fire—usually every year. Many trees are injured and the brush is subdued, while young growth is decimated or entirely prevented.

Reproduction.—Free on all the better soils, except as affected by fire and grazing.

Second growth.—Deficient, owing to the prevalence of fire.

Undergrowth.—Though many seedlings start very few are able to form trees, as they are either killed by fire or eaten off by cattle. The natural supply of brush, which would otherwise be abundant in this pine forest, is kept very thin by fires and grazing.

Rate of growth.—Medium to slow.

Water power.—Abundant along the river. Near Burton the river is 75 feet wide and 1½ feet deep, and rapid.

Prices of land.—The best farm land can be bought for $10 per acre, while the price of mountain land is nominal.

TIGER CREEK BASIN (RABUN COUNTY, GA.).

Area.—Total, 20 square miles; cleared, 2.44 square miles; wooded, 17.56 square miles.

Surface.—About 4 square miles of the lower portions of the valleys are smooth enough to be arable. The remainder is hilly.

Soil.—The lower lands are generally sandy loam, while the soil on the slopes is usually a loam, derived from a decomposition of gneiss in place.

Humis and litter.—Very little.

Agricultural value.—Some of the lower lands are very productive when new, but most of the old clearings have been depleted by repeated cropping without fertilization. The ridge lands are not worth cultivating.

Timber trees.—Substantially the same as in the Tallulah Valley, but here the average growth is more vigorous and the stand is better.

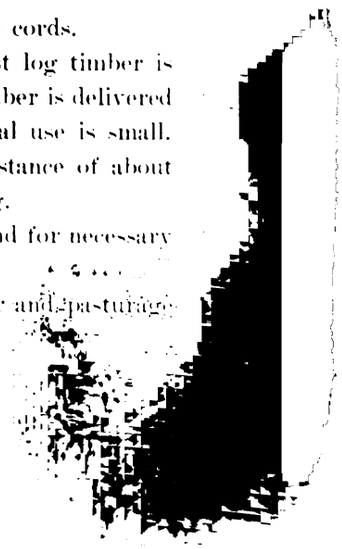
Yield.—Log timber, 21,049 M feet B. M.; small wood, 168,540 cords.

Demand.—There is very little demand for timber. The best log timber is delivered at the mill for $3 per thousand feet, and the sawed lumber is delivered at Tallulah Falls for $9 per thousand feet. The demand for local use is small.

Accessibility.—A fair wagon road leads to Tallulah Falls, a distance of about 12 miles. In the forests there are no serious obstacles to logging.

Cutting.—Very little cutting has been done, except to clear land for necessary buildings and fences.

Fire.—Most of the area is burned over every year, and timber and pasturage are thus injured and young growth is prevented.



Reproduction.—On the best soils free, but owing to the frequent fires seedlings are rarely able to develop into trees.

Second growth.—Deficient, owing to the customary fires.

Undergrowth.—Scant, owing to fires and grazing.

Rate of growth.—Medium.

Water power.—The stream in its lower course is about 20 feet wide and 9 inches deep, and rapid.

Prices of land.—Ten dollars per acre would probably buy the best farm in the valley; 50 cents per acre would buy the ridge land.

PERSIMMON CREEK DISTRICT (RABUN COUNTY, GA.).

Boundaries.—The divides, including the entire drainage basin of this stream and the land below it draining into the Tallulah River above Burton.

Area.—Total, 18 square miles; cleared, 2.77 square miles; wooded, 15.23 square miles.

Surface.—Hilly to mountainous.

Soil.—Light colored and shallow, except in ravines and coves.

Humus and litter.—Scant, except in a few damp areas on north slopes.

Agricultural value.—Slight. The ridges are poor, and the lowlands, once fairly fertile, have been cultivated until nearly exhausted.

Timber trees.—Substantially the same as in the Tallulah Valley.

Yield.—Log timber, 13,773 M feet B. M.; small wood, 139,395 cords.

Demand.—There is no market for log timber, as it is too far from shipping points. There is no sale for local use, because every resident has timber of his own.

Accessibility.—A fair wagon road leads into this valley from Clayton and from Tallulah Falls. The forest here is not especially difficult for logging operations.

Cutting.—No cutting has been done, except to supply the local demand for buildings and fences.

Fire.—Fires are very frequent and the forest shows their effect in injured butts and deficient young growth.

Reproduction.—Free, except for fires and grazing.

Second growth.—Deficient, owing to the custom of burning the woods frequently.

Undergrowth.—There is very little brush and seedlings are few. Seedlings start abundantly, but some reach only 1 foot above the ground before they are killed by fire.

Rate of growth.—Not studied.

Water power.—The stream near its mouth is 25 feet wide and about 6 inches

Yield.—Log timber 6,420 M feet B. M.; small wood, 45,000 cords.

Demand.—There is very little demand for the market. Much of the best timber has been cut for local use.

Accessibility.—Fair wagon roads lead to Tallulah Falls, about 18 miles distant. The mountain sides offer no special difficulties to logging operations.

Cutting.—Figured woods and the choicest of the poplar, ash, cherry, and walnut have been culled for the market, and large amounts of oak, chestnut, and other woods have been cut by the farmers for buildings, fences, and fuel.

Fire.—Fires prevail in dry periods wherever there is material enough to feed them. The forests are considerably depleted by them.

Reproduction.—Free, except for fires and grazing.

Second growth.—Deficient. The supply of saplings has been greatly reduced by fire.

Undergrowth.—Scant, owing to fires and grazing.

Rate of growth.—Not observed.

Water power.—Limited. The stream is small and variable.

Ownership.—Most of the tract is owned by resident farmers.

Prices of land.—Twenty dollars per acre would buy the best farm land, and the mountain ridges could be bought for 50 cents to $2 per acre.

TALLULAH RIVER BASIN ABOVE PLUM ORCHARD AND PERSIMMON CREEKS (RABUN AND TOWNS COUNTIES, GA., AND MACON COUNTY, N. C.).

Area.—Total, 40 square miles; cleared, 1 square mile; wooded, 39 square miles.

Surface.—There are several isolated tracts of arable land along the river. Elsewhere the slopes are usually steep and rocky. Some of the ravines have precipitous sides.

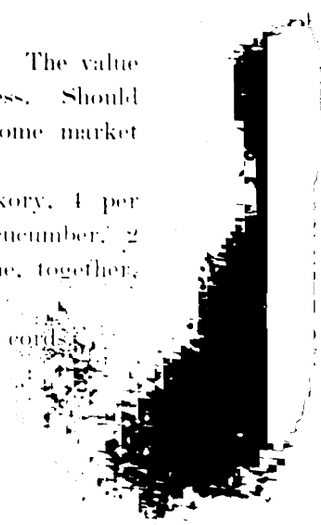
Soil.—Usually fertile in the lowlands, ravines, and coves. The ridges have better soil than is common on ridge lands southward.

Humus.—Abundant in ravines and coves and on north slopes.

Agricultural value.—Nearly all crops grow well in this valley. The value of the land for agriculture has been limited by the difficulty of access. Should the corundum plant at Tate City be kept in operation, a good home market would be developed for farm produce.

Timber trees.—Oaks, 75 per cent; black gum, 3 per cent; hickory, 4 per cent; chestnut, 6 per cent; ash, poplar, and cherry, 5 per cent; cucumber, 2 per cent; buckeye, 2 per cent; white pine, hemlock, and pitch pine, together, 3 per cent.

Yield.—Log timber, 72,040 M feet B. M.; small wood, 388,400 cords.



Demand.—Even the best of the log timber commands only a nominal price on the stump, owing to its distance from market. Mining operations promise to greatly increase the local demand.

Accessibility.—At present the center of this valley is about 30 miles, by rough wagon road, from the railroad at Tullulah Falls. The mining company proposes to build a railroad up the valley. Even with good transportation from the main valley, the timber on the tributaries would be difficult to get out, owing to the steep rocky slopes and the great amount of brush in some of the ravines.

Cutting.—No cutting has been done except for local use. The greatest amount of log timber used was taken out by the mining company for its separating mill and for the houses of its employees.

Fire.—Fires have been less prevalent in this region than in that adjoining, owing principally to the sparse population. The development of the mines by introducing more people will undoubtedly make fires more prevalent.

Reproduction.—Free, except on the highest ridges.

Second growth.—There are many saplings, but hardly enough to make a good stand were the mature trees cut.

Undergrowth.—There is a great deal of brush, especially laurel, in the ravines and on moist slopes. The ridges are more free, but even there huckleberry, azalea, and seedlings of trees are often quite dense.

Rate of growth.—Fairly rapid.

Water power.—Abundant.

Prices of land—Prior to the building of the corundum separating mill the best land was valued at about $5 per acre, while the mountain ridges could be bought for 50 cents to $1 per acre.

TOXAWAY RIVER BASIN.

Topography.—This basin drains into the Atlantic through Savannah River. The headwaters of the Toxaway are far back in the Blue Ridge, through which they have, by erosion, almost worked their way.

The principal peaks about the headwaters are: Sheep Cliff, 4,653 feet; Double Knob, 4,417 feet; Great Hogback, 4,700 feet, and Cold Mountain, 4,500 feet.

The descent from these peaks is rapid, amounting to 3,500 feet in 6 miles on the Toxaway. There are few prominent points within the basin, but the canyons are deeply eroded, and cascades are almost continuous along the Whitewater, Horsepasture, and other tributaries.

The basin has an area of 52,243 acres, of which 95 per cent is wooded.

Soil.—Derived from gneiss, and in general well forested. The soil is fertile. It is usually a loam of good physical quality. The ridge land is, of course, less fertile, yet is capable of growing valuable timber.

Agriculture.—The few clearings that have been made yield good crops of grass and corn; but the roughness and steepness of the surface will prevent any extensive agriculture.

So little of the land has been cleared that eroded fields are not a prominent feature of the landscape, as in many other localities; but enough has been cleared to show what the effect would be. The soil has numerous pebbles and is not eroded by rainfall as readily as clay or sand; but, on the other hand, the slopes are so steep and the streams so torrential that it would be unwise to uncover any but the gentlest slopes and the most fertile soil.

The forest.—The forest of this tract is but slightly broken, only 5 per cent being cleared. The northern portion, lying well up on the Blue Ridge, has substantially the same species as the forest of the highlands northward. The oaks, hemlock, and white pine predominate. Chestnut, hickory, and gum are also abundant. Lower on the slopes the oaks, hickories, and black and yellow pines become more prominent.

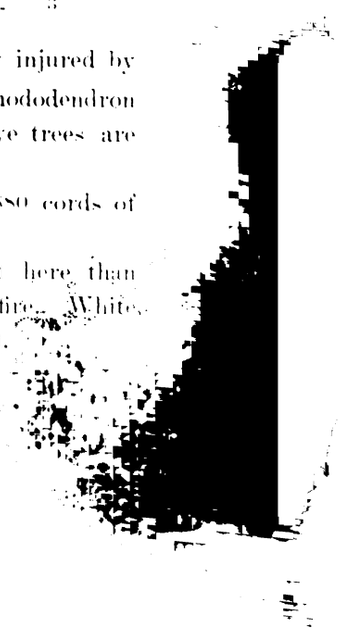
Proportions of timber species in Toxaway River basin.

	Per cent.
Oaks	55
Hemlock	7
Birch	1
Shortleaf pine	2
Chestnut	10
Other species	8
Ash	1
Hickory	7
White pine	3
Black gum	3
Black pine	3

The forests of this region are variable; they have been seriously injured by fires, and as a result have some large openings on the ridges. Rhododendron and *Kalmia* constitute a dense undergrowth in the hollows. Defective trees are abundant throughout, but the stand of valuable species is poor.

The basin contains 65,088 M feet B. M. of log timber and 931,880 cords of small wood.

Improvement in forest condition may be rather more difficult here than elsewhere, owing to the abundance of brush and the liability to fire. White and shortleaf pine are the most promising species for a future forest.



SALUDA AND FIRST AND SECOND BROAD RIVER BASINS.

Topography.—The small portions of these two drainage systems examined are so similar that they may be described together. Both lie on the southeastern slope of the Blue Ridge, and both drain into the Atlantic through Santee River.

The Blue Ridge at the heads of these basins is about 3,000 feet in elevation and the lowest land covered by these descriptions is about 1,200 feet. The slopes drained by the Saluda are steep and often precipitious, and include Table Rock and Cæsars Head, both bold, rocky points, affording two of the grandest views in the whole region. The cascades and falls through the glens of South Saluda and other creeks are very pretty. There is very little alluvial land on the creeks until they reach the plain at the foot of the Blue Ridge. The slopes drained by the broad rivers are more moderate. The spurs reach out long distances toward the plains, while between these spurs are rapid but seldom cascading creeks, with somewhat interrupted alluvial bottom lands.

Saluda River basin has an area of 30,796 acres, of which 94 per cent is wooded. The Broad River basins have an area of 54,400 acres, of which 80 per cent is wooded.

Soil.—In both regions the soils are derived from granite, gneiss, and schists, which, when they remain in place, make excellent land, but when washed and the finer sediments left in one place, the coarser in another, become less desirable, as the clays thus formed are stiff, impervious to water, and hard to work, while the gravels are porous and light.

Agriculture.—Corn and cane are the principal crops of this region. Some grass is grown on the small clearings in the higher altitudes, and some inferior orchards are seen. Sweet potatoes are grown on every plantation, and a few small cotton fields are found on the edge of the plain.

The lack of grass on most of this area leaves the surface exposed to the cutting action of falling rain, and the eroding effect is so severe and so evident that, in the foothills, no one attempts agriculture upon the ridges. Even the gentler slopes on the borders of the alluvial bottoms are often gullied until they become not only worthless themselves, but are a source of damage to the bottom lands below, which receive the material washed from them.

Even with such protection as the frequently burned forests afford, the humus is washed from the woods, and, being light, is carried far down the stream to still waters before it finds a lodging place.

The forest.—Substantially all the ridges and steeper slopes are forested more or less densely, while the creek bottoms are cleared. The cleared area comprises 6 per cent of the Saluda basin and 20 per cent of the Broad River basins.

These forests are principally oaks and hickory, with a sprinkling of nearly all other species mentioned in the accompanying list.

Proportions of timber species in Saluda River basin.

	Per cent.
Oaks	60
Hemlock	1
Hickory	8
Chestnut	8
Black gum	3
Black pine	3
White pine	1
Birch	1
Shortleaf pine	2
Other species	13

Proportions of timber species in First and Second Broad River basins.

	Per cent.
Oaks	60
Linn	1
Hickory	8
Chestnut	7
Black gum	3
Black pine	8
Hemlock	1
Birch	1
Shortleaf pine	3
Other species	8

In condition these forests are inferior. There is very little log timber. Many of the trees are fire scarred; many, though old, are small because fire and erosion of humus have retarded growth. Much of the area has a deficient stand, because fires have killed seedlings.

The Saluda basin contains 46,648 M feet B. M. of log timber and 468,600 cords of small wood. The Broad basins contain 460,000 cords of small wood.

To improve this forest it would be necessary to prevent fire and possibly to thin out defective trees and undesirable species. The species to be favored here are poplar, ash, walnut, shortleaf pine, post oak, and white oak, and, in the higher altitudes, white pine.

CATAWBA RIVER BASIN.

Topography.—This area includes the eastern or southern slope of the Blue Ridge, with its numerous spurs, from Blowing Rock southward to Edmondson Mountain, and is drained by the headwaters of Catawba River, including Johns River, Linville River, and the North and South forks of the Catawba, directly through Catawba River into the Atlantic. The elevated crest of the Blue Ridge, with a few points on it at a lower elevation than 4,000 feet, and rising

A. WHITE PINE DEADENED IN CLEARING LAND, MITCHELL COUNTY, N. C.

B. PROTECTION AGAINST EROSION BY PARALLEL DITCHES.

Proportions of species in Catawba River basin—Continued.

	Per cent.
Poplar	1
Black gum	3
Locust	1
White pine	5
Ash	1
Birch	1
Black pine	2
Other species	8

Nearly all south and east slopes, especially at a low elevation, have been damaged by fires to some extent. The best hard woods over much of the area have been culled, and the best white pine has been culled from the lower part of the valley of Johns River and from a portion of the upper Linville. There is yet much hard wood, largely oak, on the headwaters of the Johns, North and South forks of the Catawba, and upper Linville rivers.

This basin contains 670,668 M feet B. M. of log timber and 3,871,360 cords of small wood.

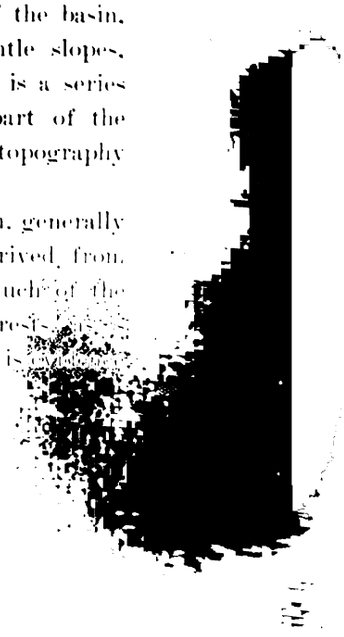
Reproduction of hard woods is free by both stool shoots and seed, and of pine by seed. Protection from fire is greatly needed. This, with improvement cuttings, would soon develop a valuable forest.

WILSON CREEK BASIN (BURKE COUNTY, N. C.).

Area.—Total, 68 square miles; cleared, 5 square miles; wooded, 63 square miles; burned, 3 square miles.

Surface.—Wilson Creek drains a triangular basin, which has one corner on Grandfather Mountain and one on Cranberry Mountain, the other at the mouth of the creek. It is divided into a series of deep narrow valleys, separated by lofty and rough mountain spurs from Grandfather Mountain, Grandmother Mountain, and Cranberry Mountain, which converge toward the mouth of the creek. There are small areas of alluvial bottoms in the lower part of the basin, and beyond these bottoms on either side are some low hills with gentle slopes, but the area of such is limited. The prevailing topographic feature is a series of long steep ridges, inclosing very narrow valleys. In the upper part of the basin there are a few elevated plateau-like benches with a more gentle topography and broad, lofty hills.

Soils.—The soil of the uplands is a coarse, sandy or gravely loam, generally thin, but in some places fairly deep, even on the slopes. It is derived from conglomerates, slates, and a coarse gneiss. In spite of its sandiness, much of the soil in the upper part of the valley is well suited for coniferous forests, as shown by the fine stand of white pine which it bears in places. There is [illegible]



that this forest was at one time far more extensive, but that successive fires have destroyed it.

Humus and litter.—Only in the hollows has the ground cover been undisturbed, for nearly all of the slopes have been burned at one time or another. On some of the steep southern slopes humus is almost wanting.

Agricultural value.—The bottom lands are fairly productive, but in many places are too sandy and light. The upland soils are too deficient in clay and too porous to be profitably cultivated, although the lower part of the valley is well cleared and the middle part dotted with farms.

Timber trees.—Oak forms about 45 per cent, chestnut about 20 per cent, and pine, largely white pine, 15 per cent of the forest. There is some sourwood, hickory, birch, linn, and maple, and in a few places some tulip poplar, with several small bodies of hemlock. The lower part of the valley has been partially culled; no cutting has been done in the upper part.

Reproduction.—White pine reproduces well wherever it is given full light and a suitable seed bed. Thickets of other trees are not infrequent where the conditions for germination are suitable and where they have not been destroyed by fires.

Second growth.—There are a few stands of young pine which are in excellent condition, and some second-growth hard woods, chiefly sprouts, in the woodland adjoining the farms. The proportion of such, however, is insignificant.

Undergrowth.—*Kalmia* and rhododendron form dense thickets in many places. A great deal of the white-pine forest has a thick undergrowth of azaleas and other shrubs.

Rate of growth.—White pine makes excellent growth, but that of the hard wood and hemlock associated with it is not near so rapid. The yellow pines make fair growth.

Water power.—There is ample fall, but the stream is too small to furnish power for a large plant.

Ownership.—The upper part of the basin is held in large tracts for speculative purposes; the lower part is held in small tracts by residents.

Prices of land.—Farming land sells at $6 to $15 per acre; woodland, at $1 to $4 per acre.

LINVILLE RIVER BASIN BELOW FALLS (BURKE COUNTY, N. C.).

Boundaries.—This tract includes that portion of Linville River basin lying between the southern base of Table Rock Ridge and Linville Falls.

Area.—Total, 32 square miles; cleared, none; wooded, 32 square miles; burned, 2 square miles.

Surface.—In this portion of its course the river flows through a deep gorge between Linville Mountain and Table Rock Ridge. In few places is it more than 2 miles between the two crests of the watershed, and in many places the gorge is more than 2,000 feet deep. The descent of the river is a continuous series of rapids and falls, there being more than 2,000 feet of fall in 12 miles. The slopes of both mountains are in all places very steep. There are many cliffs, and none of the land is suitable for farming.

Soils.—The soils on the Linville Ridge are very thin and sandy, derived from quartzite, and the rock generally lies only a few inches below the surface. There are many areas where the rock is entirely exposed. On Table Rock Ridge the soils are mostly from metamorphosed sandstones, and are generally deeper and not so sandy. Over large areas the earth is strewn with loose rock.

Agricultural value.—This land has absolutely no agricultural value, and there are no farms on the drainage basin of this part of the river.

Humus and litter.—There is very scant leaf mold in any part of this area except in the bottoms of a few of the deepest and most protected hollows. Both slopes of the basin have often been severely burned and the fires have destroyed the previous scant ground cover.

Timber trees.—Inferior hard woods mixed with small yellow pines form the forests on all of the upper slopes. In the protected hollows there are small areas of better hard woods mixed with hemlock and some white pine; the only timber trees of any value on the ridges are chestnut, oak, and yellow pine. The timber in the gorge is at present inaccessible. It is possible that it might be floated out, but the expediency of this is doubtful.

Accessibility.—There is no road, not even a riding way into the gorge.

Undergrowth.—In a few places there is a dense undergrowth, but the fires keep the woods open except for a year's growth of stool sprouts from the fire-killed shrubs and trees.

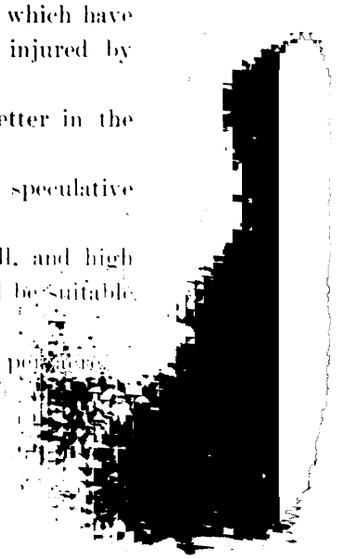
Second growth.—There is no second growth, except the young trees which have appeared on fire scalds. A great many of these have already been injured by fires; this is the case also with nearly all of the old timber.

Reproduction.—Reproduction is poor on all the slopes. It is better in the hollows where the ravages of the fires are not so great.

Ownership.—This basin forms a part of large areas held for speculative purposes.

Water power.—This portion of the Linville has a very rapid fall, and high dams could be built in many places. Much of the rock at hand would be suitable for dam construction.

Prices of land.—The price of land is stated to be from $1 to $2 per acre.



JOHN RIVER BASIN ABOVE FORKS (CALDWELL COUNTY, N. C.).

Area.—Total, 92 square miles; cleared, 14 square miles; wooded, 78 square miles; burned, 6 square miles.

Surface.—The basin is divided by the chief tributaries into a series of long, parallel valleys, which rise on the steep southern slopes of the Blue Ridge between Blowing Rock and Grandfather Mountain, and debouch toward the south. The slopes of these ridges are steep, rough, and rocky, and in many places there are cliffs. Very narrow strips of alluvial land border most of the streams nearly to their heads, but the mountains rise almost immediately from the borders of the alluvial land. In many places from crest to crest of the intervening ridges the width of the valley is less than a mile, while the difference of elevation is from 1,500 to 2,000 feet from the stream to the crest of the watershed.

Soils.—The upland soils are gray, sandy loams, in a few places fine grained and stiffer, but generally coarse grained, often gravelly or very rocky, derived from gneiss and conglomerates. The soils of the bottoms are too light and porous to be productive.

Humus and litter.—As the prevailing aspect is southerly and the slopes are dry, fires are frequent. The ground cover is proportionately scant. Many of the hollows face the south and fire passes through them.

Timber trees.—Oak and chestnut with hemlock, white pine, and maple form the greater portion of the forests, especially in the upper part of the basin. In the lower part and on the dryer slopes there is more oak, and chestnut is more largely replaced by various yellow pines. Many of the trees are fire scarred, and on all the coniferous slopes there are pines which have been killed by fires.

Yield.—The yield is from 2,500 to 3,000 feet B. M. per acre in the upper part of the valley, except on the thinly timbered upper slopes, where it is less. The merchantable timber has been cut from below Globe and some of the best has been removed from above that place.

Demand.—There is an active demand for good hard wood, for white and yellow pine lumber, and for chestnut-oak tan bark.

Accessibility.—There is a logging road from Lenoir up the valley.

Cutting.—The best timber on the main river has been cut, and cutting is in progress on Anthony Creek, one of the largest western tributaries of the river.

Reproduction.—There is generally very good reproduction after fires, especially of the pine, which finds a suitable seed bed for germination on the naked earth. Oaks and chestnut sprout freely after fires.

Second growth.—There is a limited second-growth woodland in the lower part of the valley and around the farms.

Undergrowth.—There is considerable undergrowth in many parts of the valley.

Water power.—The lower part of the river is large enough to furnish considerable power with a high dam, and there are several sites where such could be erected.

Ownership.—The forest land in the lower portion of the basin is held by resident citizens in small tracts; the upper part is held in large tracts.

NORTH FORK OF CATAWBA RIVER (M'DOWELL COUNTY, N. C.).

Boundaries.—This area includes the drainage basins of the North Fork of Catawba River and of Armstrong Creek. The basin forms a fan-shaped area lying on the eastern and southern slopes of the Blue Ridge.

Area.—Total, 122 square miles; cleared, 15 square miles; wooded, 107 square miles; burned, 8 square miles.

Surface.—On the northwest and northeast are the Blue Ridge and Linville Mountain. Slopes and lofty spurs from these penetrate the basin from the north and west, dividing the upper portion of the basin into a series of narrow, parallel, and often gorge-like valleys. The head of Catawba River, lying between Hogback Mountain and Linville Mountain, occupies a gorge with almost precipitous slopes on either side, the crests of the surrounding mountains rising from 1,000 to 2,000 feet above the bed of the stream. The lower part of the basin opens out into the rolling country of the upper edge of the Piedmont Plateau.

Soils.—Soils of the western and southern part of the basin are derived from gneiss and schist, and are deep and generally smooth, even where steep. Those of the northeastern part are derived from quartzite, and are thin, sandy, and sterile.

Agricultural value.—Below the junction of Armstrong Creek and the North Fork there are only a few narrow strips of alluvial land; below there the bottom lands are broader. The upland soils, where derived from gneiss and schists, are generally productive; those that are derived from quartzite are too thin and sandy to be agricultural. The steep lands lying along the face of the Blue Ridge are largely in grass, though some corn is raised even on the steep slopes. A considerable amount of fruit is raised, and the production of fruit is yearly receiving more attention.

Humus and litter.—In the deep hollows there is much leaf mold. The woodland is subject to pasturage, and this in many places tends to prevent the accumulation of mold by breaking its cover and allowing it to wash. The slopes

GRANDFATHER MOUNTAIN, NORTH CAROLINA; THE HIGHEST POINT ON THE BLUE RIDGE.

and Cranberry mountains, which divide the upper part of the basin into a series of deep, narrow hollows, alternating with rough, high, and steep ridges.

Soils.—The soils of the mountainous portion of the basin are generally gray loams, sandy and thin, and often very rocky. Those of the lower part are red loams much deeper and free from rocks.

Humus and litter.—Leaf mold is scant, except in the deepest hollows where it has been protected from fires.

Agricultural value.—Except on the narrow alluvial strips the soils on the mountains are poor, and agriculture is carried on at a decided disadvantage. The alluvials in many places are sandy and porous. The red soils of the hill country are by no means fertile, but are more easily cultivated than the steep and sandy mountain slopes.

Timber trees.—Oaks, largely the scarlet and chestnut oak, form 50 per cent or more of the forest; chestnut, about 30 per cent; black, white, and scrub pine, from 10 to 15 per cent. In the deep hollows there is a small amount of maple, linn, birch, ash, and poplar.

Yield.—The yield is about 2,500 feet B. M. per acre.

Demand.—There is a limited demand in the lowest part of the area for the very best grades of hard-wood timber for shipping. There is a better demand for pine for local use.

Accessibility.—The distance from the nearest point of the basin to Morganton, the nearest railroad station, is too great to permit the profitable handling of any but the choicest lumber.

Second growth.—Second growth is not abundant and is generally confined to the woodland associated with the farms. It consists largely of pine groves and scarlet oak, chestnut, and sourwood sprouts. In the burned forest areas there is sometimes a considerable amount of young chestnut and oak sprouts.

Undergrowth.—*Kalmia* forms many thickets on rocky land, and there is a considerable amount of brush which has followed fires.

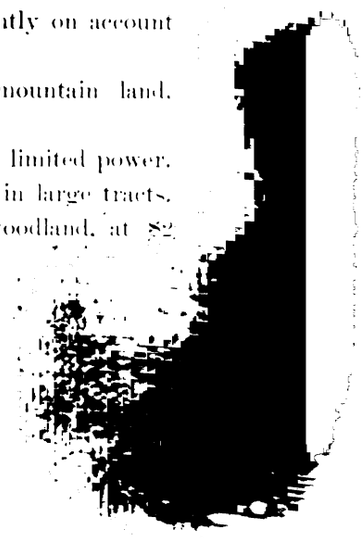
Reproduction.—Young trees are generally not abundant, evidently on account of the fires which destroy the seedlings.

Rate of growth.—Accretion is slow on nearly all of the mountain land. White pine on the foothills makes very good growth, however.

Water power.—The streams are too small to yield more than a limited power.

Ownership.—The largest portion of the mountain land is held in large tracts.

Prices of land.—Farming land sells at $5 to $30 per acre; woodland, at $2 to $5.



HEADWATERS OF CATAWBA RIVER ABOVE OLD FORT (M'DOWELL COUNTY, N. C.).

Area.—Total, 42 square miles; cleared, 5 square miles; wooded, 37 square miles; severely burned, 8 square miles.

Surface.—The topography of the basin is extremely rough. It is fan-shaped and is penetrated by numerous high spurs, which converge toward its northern part. The Blue Ridge forms its upper boundary. The valleys of the numerous tributary streams are deep, narrow gorges, with only occasional limited areas of alluvial bottom. The slopes of the dividing ridges are steep and rugged; in many places encumbered with rocks and bowlders or forming cliffs.

Soils.—The soils are gray or loose loams, generally coarse grained or gravelly, derived from gneiss. On the slopes of the steep ridges they are extremely thin, and even in the valleys are seldom very deep. The bottom lands have been severely washed by numerous and disastrous freshets.

Humus and litter.—On the steep upper slopes, especially those with southerly exposures, there is almost no soil cover; in the hollows, however, humus has accumulated to a considerable depth. The upper slopes of the mountains are periodically and severely burned.

Timber trees.—Oaks form about 45 per cent and chestnut about 35 per cent of the forest. On dry, especially gravelly slopes, there is a considerable intermixture of shortleaf, black, and scrub pines, and in the hollows maple, hickory, birch, linn, ash, and occasionally yellow poplars are found.

Yield.—The average stand per acre is about 2,500 feet B. M. of merchantable timber; in some of the deep hollows where there has been no culling it is considerably more, and on the thinly timbered slopes it is much less.

Demand.—There is an active demand for nearly all grades of lumber, and for oak and hemlock tan bark.

Accessibility.—The Southern Railway passes through the middle of the basin and there are roads up nearly all the large tributary streams.

Cutting.—A large part of the basin has been cut over several times, but there are several thousand acres at the head of the river which are yet unculled. A large amount of tan bark has not yet been removed, but is being gotten out as rapidly as possible for the tannery at Morganton. There is a small mill at present cutting on the stream, with a capacity of about 10,000 feet per day.

Second growth.—There is no second growth of value, as the repeated fires injure stool shoots before they become large enough to be of any use.

Undergrowth.—While there is not very much *Kalmia* or rhododendron, there is, in nearly all the badly burned woods, a considerable undergrowth of sprouts from fire-killed trees and deciduous shrubs.

Rate of growth.—Accretion is slow, except on moist soil in the deep hollows and at the base of the slopes.

Water power.—Although there is ample fall, the streams are too small to develop a large power.

Ownership.—About one-fourth of the forest land is owned by residents; the rest is held in large areas for speculative purposes.

Prices of land.—Farming land sells at $4 to $30 per acre, except the best bottom land, which brings from $50 to $100 per acre. Woodland sells at $1 to $4 per acre.

BRUSH, CLEAR, AND CRIB CREEK BASINS (M'DOWELL COUNTY, N. C.).

Area.—Total, 68 square miles; cleared, 11 square miles; wooded, 55 square miles; burned, 2 square miles.

Surface.—The surface of this area is penetrated from the northwest by lofty spurs of the Blue Ridge, which divide it into a series of narrow, gorge-like valleys. There is very little bottom or rolling land along the base of the mountains. The mountains are steep and generally rocky.

Soils.—The prevailing soils are loams and loose loams, often coarse grained and gravelly, derived from gneiss and metamorphosed sandstone. They are generally thin, and are not fertile even where the slopes are gentle. The bottom lands are more productive, but in some places they have been badly washed by freshets.

Humus and litter.—On the steep upper slopes, especially those with southerly aspects, there is little leaf mold. Fires are not infrequent and humus is scant over the entire burned area.

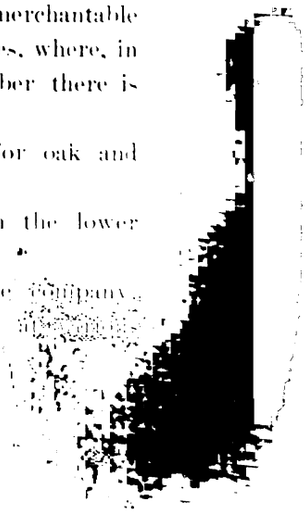
Timber trees.—The oaks compose about 50 per cent of the forest; chestnut about 30 per cent. On sunny slopes there is a little intermixture of pine, especially at low elevations. In the hollows typical Appalachian hard woods are dominant, associated with hemlock. In a few localities there is some white pine.

Yield.—The average stand is from 2,000 to 3,000 feet B. M. of merchantable timber per acre, except on the steepest and most stony southern slopes, where, in many places, it is less than 500 feet. In addition to the mill timber there is about one cord of oak and hemlock tan bark per acre.

Demand.—There is an active demand for good timber and for oak and hemlock tan barks.

Accessibility.—The Southern Railway lies only a few miles from the lower part of this area, which is penetrated by numerous wagon roads.

Cutting.—The greater part of the timber is owned by a large company which has just begun its exploitation. Several small mills have cut



places on the lower parts of the streams, but the greater portion of the area has never been culled.

Reproduction.—Nearly all of the broad-leaved species, when small, sprout from the stump when cut or fire killed. Where protected from fire and suitable light conditions prevail, there are abundant seedlings of the dominant elements in the forest.

Second growth.—There is a considerable amount of second-growth poles and saplings at various places in the forest where old fires have run. This is especially the case in the pine woods at low elevation.

Undergrowth.—Shrubby undergrowth is scant, but there are occasional thickets of *Kalmia* and other shrubs.

Rate of growth.—On moist soils accretion is good. On dry soils and at high elevation it is not so rapid.

Water power.—The streams are too small to yield a large power, but there are many falls which could be utilized by small plants.

Ownership.—There are 9 families on Crib Creek, 20 on Clear Creek, and about the same number on Brush Creek.

Prices of land.—Farming land sells at $4 to $20 per acre; woodland, at $1 to $5 per acre.

YADKIN RIVER BASIN.

Topography.—The portion of the basin of this river examined includes the eastern slope of the Blue Ridge, with its spurs from Bullhead Mountain southward to Blowing Rock. It is drained by the head streams of the Yadkin and all of its northern tributaries eastward to and including Roaring River. The crest of the Blue Ridge, with an elevation of more than 2,500 feet, limits the area on the north; and from this, numerous sharp and steep spurs penetrate the area, dividing it into a series of narrow parallel basins, trending northwest and southeast, from the southern ends of which the streams emerge and unite to form the Yadkin, at an elevation of 1,000 feet.

The topography is rough, the slopes of the ridges steep, the intervening valleys narrow, showing unchecked, natural erosion from a high mountain mass to a lower base level, in a country with rock of varying hardness and an abundant rainfall.

The basin has an area of 253,120 acres, of which 84 per cent are wooded.

Soil.—The alluvial lands in the valleys are narrow strips or small bodies, seldom more than a few acres in area, of dark, sandy-loam soils, rich in humus, and fertile; or occasionally of coarse sand, and poor. The soils of the uplands, produced by the decomposition of slates, sandstone, and gneiss, are highly siliceous, and often coarse and poor. On north slopes and in the hollows accumulated

mold adds to the fertility and checks the removal of the finer, clayey particles; while the poverty of the naturally infertile south slopes is augmented by repeated fires which destroy the litter and facilitate the removal of the finer particles of the soil by the heavy rains.

Agriculture.—Corn is the staple crop on the alluvial lands and on the slopes at lower elevations, while corn, grass, and some apples are cultivated on the shady north slopes at high elevations and in the deep, cool hollows that indent the face of the mountain.

Some of the alluvial bottoms have been damaged by being washed and gullied by freshets, or by the deposit of coarse sand and gravel brought down from the mountains. Many of the steep slopes, exposed to erosion by the naked cultivation required for corn, have been gullied to the bed rock, and their agricultural value temporarily destroyed. Many such abandoned fields are being colonized by wind-sown pine seedlings, which check further erosion and rebuild the soil.

The forest.—The forests, which are confined to the slopes, are formed of hard woods, chiefly oak, associated with pine (black, rarely with white) on the drier south and east slopes; and of mixed hard woods—oak, chestnut, maple, poplar, linn, and ash—associated with hemlock in deep hollows and on north slopes. The better forests lie to the southwest of Mulberry Gap. East of this gap the oak and pine are smaller and of poorer quality, and have suffered more from fires; but fires have also done much damage to the pine and oak growing on the southward slopes. Culling has been carried on for many years, much of the choicest timber having been removed from the bordering lands, even to the sources of the streams; but much oak and some pine yet remain.

The hard woods reproduce freely from stool shoots and the pines from seed. To prevent further deterioration of the forest and improve its condition, protection from fire is necessary, while improvement cuttings are required in many places to remove worthless stock and to free young timber.

The basin contains 539,920 M feet B. M. log timber and 3,256,960 cords of small wood.

The proportions of timber species are as follows:

Proportions of timber species in Yadkin River basin.

	Per cent.
Oaks	60
Hemlock	3
Birch	1
Other species	8
Locust	1
Chestnut	12
Linn	1

SWANNANOA RIVER NEAR ASHEVILLE, N. C.

Proportions of timber species in Yadkin River basin—Continued.

	Per cent.
Maple	1
Black pine	3
White pine	2
Black gum	2
Hickory	5
Shortleaf pine	1

ROARING RIVER BASIN.

Area.—Total, 83.75 square miles; cleared, 21.25 square miles; wooded, 62.50 square miles.

Surface.—Hilly to mountainous, except the narrow creek bottoms, which are level.

Soil.—Light-colored loam, shallow except along the creek bottoms, where it is sandy.

Agricultural value.—Corn is grown with the aid of fertilizers on the creek bottoms. Grass does well along the crest of the mountain and in the higher coves. The lower ridges and slopes are not agricultural land.

Timber trees.—Oak, 70 per cent; chestnut, 20 per cent; white pine, hemlock, black pine, etc., together, 10 per cent.

Yield.—Log timber, 42,880 M feet B. M.; small wood, 607,200 cords.

Demand.—Nominal, owing to difficulty of access, long haul, and bad roads. The most accessible of the best might bring $1 per thousand feet on the stump.

Accessibility.—The higher slopes are steep, and the present roads poor and subject to the wash of creeks which either cross or follow them.

Fire.—Frequent fires on the dry ridges exposed southward have greatly injured the forest by preventing reproduction. But little marketable timber has been killed, however.

Second growth.—Inferior because of fires and defective trees remaining from the old forest.

Undergrowth.—Light, except in ravines where laurel is dense.

Reproduction.—Free, except for fire.

Rate of growth.—Rapid, except on driest ridges.

Water power.—Numerous small powers along the branches and on the main stream, but the flow is inconstant and hard to hold.

Ownership.—Numerous small tracts are held by resident owners.

Occupancy.—The tract is dotted with small clearings. About 250 families are living in this basin.

Prices of land.—From 50 cents to $15 per acre.

NORTH AND MIDDLE FORKS OF REDDIE RIVER BASINS (WILKES COUNTY, N. C.).

Area.—Total, 50.25 square miles; cleared, 12.75 square miles; wooded, 37.50 square miles.

Surface.—Mountainous, with long spurs reaching from the Blue Ridge toward Yadkin River, and narrow valleys having very narrow bottoms between.

Soil.—Light-brown loam on the mountains, red clay on the foothills; none of it very fertile.

Humus and litter.—Light, mostly consumed by the frequent fires.

Agricultural value.—Too rough and steep on the hills, while the narrow bottoms are liable to wash. A little grass is grown in the higher coves, and a little corn along the creeks.

Timber trees.—Oak, 75 per cent; chestnut, 15 per cent; others, 10 per cent.

Yield.—Log timber, 38,880 M feet B. M.; small wood, 434,400 cords.

Demand.—Too remote from rail. The best white pine and oak bring $1 per thousand feet on the stump.

Accessibility.—Roads are poor, but otherwise there would be no great difficulty in logging.

Fire.—Frequent; the damage is not striking, but the forest is in very inferior condition on this account.

Second growth.—There are many promising saplings, but the growth is insufficient because of fire.

Undergrowth.—Light, except in ravines where are dense thickets of laurel.

Reproduction.—Deficient because of much fire; otherwise free.

Rate of growth.—Medium.

Water power.—Limited, because fluctuating. There are some good sites along the lower streams, however.

Ownership.—The tract is mostly divided into small holdings.

Occupancy.—About 100 families are now living on this tract.

Prices of land.—From 50 cents to $15 per acre.

MULBERRY CREEK BASIN (WILKES COUNTY, N. C.).

Area.—Total, 26.25 square miles; cleared, 6 square miles; wooded, 20.25 square miles.

Surface.—Hilly to mountainous.

Soil.—Light, especially on the ridges. There is some fair sandy loam along the creeks.

Humus and litter.—Light, mostly consumed by frequent fires.

Agricultural value.—Corn is grown on the sandy creek bottoms. Wheat is grown on the clay lands, but grass is limited to a small area in the higher coves.

Timber trees.—Oaks, 75 per cent; chestnut, 10 per cent; other species, 15 per cent.

Yield.—Log timber, 77,120 M feet B. M.; small wood, 158,030 cords.

Demand.—Because of remoteness from rail and the poor condition of roads, the best log timber brings only $1 per thousand feet on the stump.

Accessibility.—The natural grades are very favorable toward Wilkesboro, but the present roads are poor, and the distance is long. The slopes are often steep and rocky.

Fire.—Although frequent, very few large trees are killed; the forest is very inferior on this account.

Second growth.—Saplings are abundant, except on the drier ridges, where the stand is reduced by fire.

Undergrowth.—Light, except in ravines, where laurel thickets abound.

Reproduction.—Free, except as injured by fire.

Rate of growth.—Rapid, except on the driest ridges.

Water power.—Inconstant. Local grist and saw mills are frequently damaged by floods.

Ownership.—Mostly divided into small tracts held by local residents.

Occupancy.—About 100 families are scattered along the creek and branches.

Prices of land.—Fifty cents per acre is a common price for mountain land. The best creek bottoms bring $30 per acre.

SOUTH FORK OF REDDIE RIVER BASIN (WILKES COUNTY, N. C.).

Area.—Total, 15.75 square miles; cleared, 2.25 square miles; wooded, 13.50 square miles.

Surface.—Hilly to mountainous, except creek bottoms, which are very narrow and frequently interrupted.

Humus and litter.—Light, except in north coves where fire is infrequent.

Soil.—Light. On the ridges derived from gneiss by decomposition and usually much washed. The creek bottoms are sandy and light. Along the foothills is a light-colored, clay loam ("white land"). The lower slopes are usually red clay.

Agricultural value.—Corn is grown on the creek bottoms by the aid of fertilizers, and wheat on the lower clay lands. Grass holds well only in the higher altitudes.

Timber trees.—Oaks, 75 per cent; chestnut, 10 per cent; hickories, maple, gum, white, black, shortleaf, and scrub pine, with a sprinkling of cherry, walnut, ash, and poplar, together, 15 per cent.

Yield.—Log timber, 21,920 M feet B. M.; small wood, 175,680 cords.

Demand.—Slight. The best timber has been culled out, and $1 per thousand feet on the stump is considered a fair price for the best remaining.

Accessibility.—Except for the steep slopes of most of the ridges, this basin is not especially difficult of access, but the roads are very rough.

Fire.—The ridges have been repeatedly burned, and, although little log timber has been killed by fire, the forests are in poor condition because of so much burning.

Second growth.—There are many saplings of oak, pine, and chestnut, but the stand is deficient, because of the frequent fires and the too thorough drainage along the ridges.

Undergrowth.—There are dense patches of laurel in the ravines and coves, and the ridges have much underbrush, consisting of azalea, huckleberry, and the seedlings and sprouts of timber trees.

Reproduction.—Were it not for fire reproduction would be abundant, but, as it is, the stand is not half what it should be.

Rate of growth.—Rapid, except on the driest portions of the ridges.

Water power.—Inconstant and difficult to regulate, as reservoirs would soon fill with sand and gravel. Below Whittington, however, there are several good locations for mills using a moderate amount of power.

Ownership.—Most of this land is divided into small tracts by the residents of the valley.

Occupancy.—About 40 families are scattered about on small clearings in this valley.

Prices of land.—The best bottom lands can be bought for $30 per acre, but much of the mountain land would not bring over 50 cents per acre.

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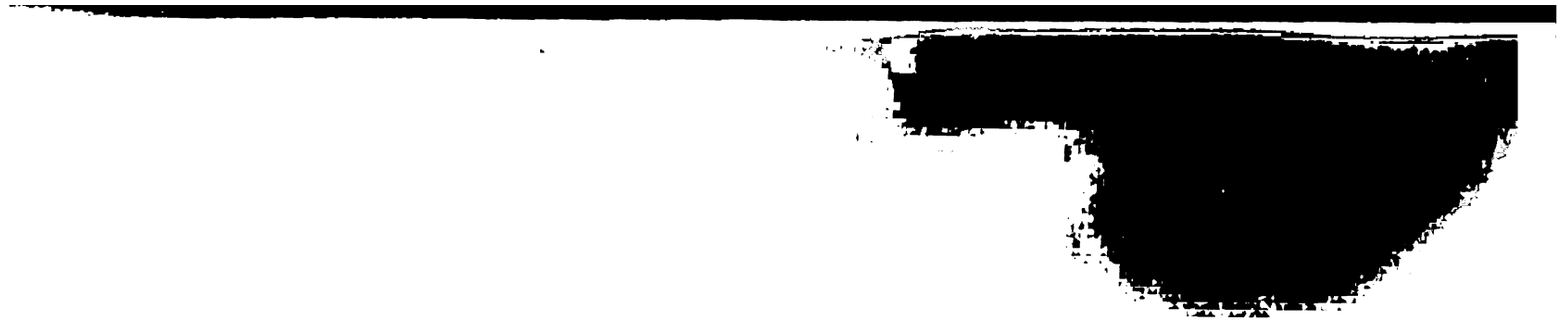

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